The Editor and a monster *Dryopteris affinis*, mid April.

EDITORIAL

The new *Pteridologist* was received with enthusiasm by the majority (94%) of those who expressed an opinion. I am very grateful to those who sent constructive comment, notably that pictures behind text confused the eye. I too regretted pages 6 and 7, though I still think the technique can work if used more carefully, as on the back cover.

The evolution of *Pteridologist* continues in this edition, though I was not entirely happy to have used smaller, tighter print this year. This is because I have had to contend with an unforeseen "crisis": too much copy, well too many excellent long articles sent in for this issue. I simply did not have enough pages to fit them all in, even after I had negotiated an extra eight. Severely edited articles were reduced and the text compacted throughout. Having never enjoyed this luxury before, I unwisely encouraged all authors to prepare their work for this issue, and some have been disappointed because I was unable to use everything we had in process. I apologise heartily to them and undertake to include their work as soon as I can. In *Pteridologist* 2004 you will read about extraordinary glass models of ferns, uses of bracken in the garden and nature prints published by Henry Bradbury in 1854, before the better-known books he made for Thomas Moore. Let us not be complacent. Please keep sending copy, particularly News & Comment, shorter items and interesting fillers.

Pictures are now an essential feature of *Pteridologist* but I'm not getting enough of really high quality so that I can choose the very best and enhance the colourful appeal of the pages. Pictures help to inform as well as decorate, and they punctuate solid text, making the page easier on the eye. Therefore, please illustrate your articles as usefully and lavishly as you can and leave me with the awkward decisions about which I should use or omit. I will then have more options with presentation, rather than struggle to make indifferent photographs suffice, as I have had to with some in this edition. Thankfully, small miracles can be performed with my computer and Adobe *Photoshop*.

I have greatly enjoyed the articles I have managed to include. I was fascinated to read about Robert Dick and I'm most taken with his portrait, though he does not look like the tough man the text declares him to be. He reminds me of the Rev. Francis Kilvert, Vicar Of Clyro, Radnorshire who walked thirty miles or so per day, visiting his parishioners, and wrote in his diary on Christmas Day, 1870:

"It was an intense frost. I sat down in my bath upon a sheet of thick ice which broke in the middle into large pieces whilst sharp points and jagged edges stuck all round the sides of the tub, not particularly comforting to the naked thighs and loins, for the keen ice cut like broken glass. The ice water stung and scorched like fire. I had to collect the floating pieces of ice and pile them on the chair before I could use the sponge and then I had to thaw the sponge in my hands for it was a mass of ice".

Those interested in fern culture will enjoy the continuing acount of Jack Bouckley's home-grown *Ophioglossum* and may also like to take up Adrian Dyer's challenge to name *their* top ferns for the British garden. Fern gardeners as well as travelling pteridologists will find Sylvia Martinelli's assistance with Chilean *Blechnum* identification valuable, for some of those included are often mislabelled garden favourites. I have initiated the section *Focus on Ferneries* which I hope will appear annually. I already have a couple ideas for the next chapter, but no authors, and it would be good to receive reports about important public fern collections.

The Killarney Fern article is a first class scoop for *Pteridologist.* I met one of the authors when teaching a ferns course but he said nothing that led me to think he knew about this rarity about which which I could only tell the group, not show them, though it was growing yards away from the path on one of our excursions. He must have been sizing me up all week to see if I could be trusted with his precious secret, silently hoping through me to enlist much needed assistance of the BPS. On the last day, he spilt the beans and when I got home, sent pictures taken before the camera tumbled to fatal immersion in the river. My reply, by return, was a request for an article. I am, and I hope you will be, profoundly impressed by the way the team of conservationists we cautiously call 'Sentinel' kept their secret for so long and carefully improved the field site, so well that this population of *Trichomanes speciosum* actually increased. We know little about the ecology of this fabulous fern but in this study we have 20 years of experience to learn from. I trust that the fuller paper will appear in a scientific journal soon. 'Sentinel' have surely proved their reliability and competence, and it is outrageous that they have been refused a permit to work in greater detail on the rarity they have guarded and assisted so selflessly.

This is a most unusual case for the conservation of a rare fern, and it is the opinion of the editor that it is an ideal cause for the BPS to foster. As requested, we should resolve formally to give our support and approve purchase of the site. With our backing documented, the authors, who are expert conservators - it is their profession - would find it easier to raise funds from appropriate grant-giving bodies. If necessary, additional fund raising will follow and we could also be involved in that.

ADVICE FOR AUTHORS

Pteridologist *welcomes contributions written in English on all aspects of the natural history and horticulture of ferns and related plants, indeed, anything fern-wise that will be enjoyed by a wide range of readers. Please refer to past editions for ideas regarding scope and presentation.*

SCRIPT: *Ideally* text should be provided in the form of a WORD, RTF or TEXT file on a floppy disc, CD-ROM (PC or MAC) or e-mailed. Typescripts can be scanned or manuscripts laboriously typed. However, surely it is not the editor's job to sort out basic use of English. Authors are expected to use reasonably correct **splelngg**, **Grammer** and **punc;tua.tion**, and write in such a way that the **meaning** of the words is conveyed.

One space between sentences and (I never thought I'd need to mention this) one space between words, please.

CONVENTIONS: Scientific names should be in italics thus: *Polystichum setiferum*, (if typed or in manuscript, underlined). Variety names should be in normal type, capitalised and enclosed in single inverted commas thus: *Polystichum setiferum* 'Plumoso-divisilobum'. Common names should be in lower case thus: soft shield fern.

ILLUSTRATIONS: As JPEG etc., but I have scanners so please send line art, good photo prints (accompanied by their negatives) or 35 mm slides which I will return. If supplying silhouettes ensure they are not of squashed and shrivelled fronds, but actually look like the fern they came from, and are of decent quality. Files larger than ~200Kb on disc or CD-ROM please, not by e-mail. **COPY DEADLINE: 31st November, 2003**

PLEASE: check your contribution thoroughly for errors and ensure you have adhered to these simple procedures *before* you send it.

To discuss your ideas: ☎ 01520 722851 💻 pteridologist@ebps.org.uk

PTERIDOLOGIST 2003

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Cover picture by Sylvia Martinelli: *Blechnum chilense* photographed on a fjord-side in the province of Aisen, near Puyahaupi (see article on page 54).

DISCLAIMER Views expressed by contributors to *Pteridologist* are not necessarily those of the **British Pteridological Society**.

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PHOTO: HEATHER McHAFFIE

Among the stylised plant carvings of the late 15th century in Rosslyn Chapel, a few miles south of Edinburgh, there is a realistic representation of hart's tongue fern with forked fronds on the capital of the Apprentice Pillar (above).

PHOTO: HEATHER McHAFFIE

Authors of successive guidebooks since the late 19th century have agreed on the identification of this fern, which has been recorded in the semi-natural woodland of nearby Roslin Glen for more than a century, and the forked form occurs there too (below, a frond collected about 200 m from the chapel in 2002). Forking like this is not uncommon in *Asplenium scolopendrium*, so its forked form is likely to have occurred there in the 1400s when the pillar was carved. *Adrian Dyer*

PHOTO: ADRIAN DYER

NEWS & COMMENT

✉ LETTERS ✉

BEAVERS & QUILLWORTS

E-mail correspondence between Clive Jermy and American Wildlife Officer, Steve Leonard, produced copy worthy of publication.

Dear Clive,

The work was performed for the Camp Shelby Army Reserve and National Guard Training Site in Mississippi (CSTS). The quillwort is Louisiana quillwort (*Isoëtes louisianensis* Thieret), listed in 1992 as "endangered" by the US Fish & Wildlife Service, based on a handful of colonies in two parishes of Louisiana. At the present time, this handsome little tetraploid is known from more than 175 streams - some intermittent to ephemeral - from south-central Alabama across southern Mississippi and ending in the original two parishes of Louisiana.

I estimate the range-wide population at 72,000 plants. Because of its federal status, the gov'ment must spend many dollars, euros and Chinese yuans to "investigate" everything pertaining to Louisiana quillwort, its environment & ecology, and possible impacts from human activity.

The site in question is Range 45, a state-of-the-art automated tank artillery range that was constructed before it became known that quillworts are nestled in the heart of its drainages. Not only does their presence alter range maintenance plans but it also affects the mobility of soldiers to zip through the wetlands at their pleasure.

Unfortunately for the military, the federally-listed gopher tortoise liked the open space, too, and their territorial expansion has also cramped the US Army. Not to be dissuaded, the Army is putting the finishing touches on an even newer $25 million tank range where they trapped the tortoises and relocated them to safer ground, built an anti-tortoise fence around, and installed $25,000 tortoise excluder devices in the roads, the Army's version of a $200 cattle guard.

Beaver pond in November 2000
Louisiana quillworts on the bank of a braided channel downstream from the dam.

Quillworts downstream were to be protected from turbidity plumes and sediment by brush dams (they didn't work effectively) but the beaver dams saved the day.

My hypothesis stated that beaver ponds must be adversely impacting Louisiana quillworts and quillwort habitat because the pond becomes a sediment trap. Impoundment ends the substrate scour activity of the free-flowing stream during flood events, thereby eliminating habitat for sporelings, and probably results in quillwort mortality from deep water inundation.

The findings show that (a) beaver traffic, dragging brush constantly to repair the dam and/or lodge provides the scour effect; and (b) plants did not die off when inundated for 10 months (0.6 m to about 1.2 m depth, in water that is deeply tannin-stained. I couldn't see them but could "feel" them underwater).

In other locations, the beaver dam itself with its several leaks makes for a braided stream where a single channel formerly existed. With beaver and other wildllife (raccoons, opossum, muskrat, etc.) visiting the shores of these braided channels, the embankment habitat is much improved for quillwort colonization. In the end, it appears that beavers could be a quillwort's best friend.

Steve Leonard
P.O. Box 310, Wiggins,
MS 39577, USA

Range 45 with darker strips of hardwood shrubs along drains where quillworts grow with the evergreen *Magnolia virginiana*.

✉ LETTERS ✉

OSMUNDA SPORELINGS

Good news from Askham Bog, south-west of York, which is one of very few local sites for *Osmunda regalis*. Reserve management has included some tree felling, leaving much more light to get through to the ground plants. Where the trees have been cleared there are now, for the first time for many years, some new royal fern sporophytes.

This is excellent news, as no sporelings have been seen at Askham for decades and one of the very large plants, one which the late Jim Russell and I saw growing in 1987, has since died. At the time the fern was in such a poor condition that Jim wrote to the owners, Yorkshire Wildlife Trust, expressing his dismay. Its loss is a great pity as it had been a magnificent specimen with fronds up to about eight feet long, if not more. Other ancient specimens are also deteriorating but one magnificent plant still thrives. When Julia Wilkins and I visited the site in 2001 we found seven of these ferns growing in various places, but they were all mature plants, several of them deteriorating. let us hope that the new arrivals really grow into large plants to grace this place where *Osmunda* has grown for centuries.

Jack Bouckley
209 Woodfield Road,
Harrogate HG1 4JE

NEWS & COMMENT

YORK CEMETERY

Jack Bouckley

In 1837 the following appeared in the *Yorkshire Gazette* announcing the first burial at York's new cemetery, that of 25 year old Charlotte Hall on 21 January 1837: "This is the first breaking of the sod to inhume a mortal's remains in the spot but how many must follow in the train is past calculation".

A lovely flower
removed, alas, how soon
from the tender watchful care
that had reared and cherished it
to be THE FIRST transplanted
into this garden of death
yet not to continue here for ever
but at the appointed season to be taken
into the paradise of God.

PHOTO: BARRY WRIGHT

During the following 165 years there have been over 122,000 bodies interred in over 28,000 graves. The exact numbers I do not know, but this I do know: from this garden of death there now blossoms forth life in the form of our newly-planted fernery.

It started in 1995 when the well-known naturalist, Prof. Alastair Fitter of York officially opened a heather bed in the old, neglected Backhouse rockery. James Merryweather and I had been invited along to this event and, as we partook of refreshments during the reception which followed, James said to me that it would be very nice and proper if a plot of ground in this area could be planted up as a fernery. I heartily agreed, and before the end of that day we had discussed the idea with the cemetery custodian.

It was left with James to continue negotiations with the Board of Trustees representing the most recent owners, York Cemetery Trust. The original owners had failed, and in 1966 liquidators were called in to wind up their affairs. No one could be found to take over the cemetery and York City Council was not interested, so the gates were locked for the next 21 years and the ground, including two listed buildings, were abandoned. The place became a wilderness until the collapse of the Chapel roof in July 1984 and the foundation of York Cemetery Trust. It took from then until February 1987, when the Trust became owners of the new freehold on the whole site. It cost them just £1.

Of course anything like this takes time, work and cash, so where should we start? In those days I used to run a stand at Bilton Gala, Harrogate, to get funds for local charities and for the Leeds and District Fern Group, so what better cause in 1996 than to earmark the takings for this fernery. We had quite a good year and banked £233.

Meanwhile, the cemetery staff started to clear a border for us and James and I enlisted the help of Julia Wilkins who readily agreed to do all she could. We asked Neil Timm to draw up plans for furnishing and decorating the site. They were very impressive, but unfortunately the trustees thought they were too ambitious, and that idea had to be shelved. An article appeared in *Pteridologist* asking members to donate any spare ferns they had. The result was rather surprising. Hardly any plants were given.

Undeterred, in 1998 we ordered the first batch of plants from Neil Timm who delivered them personally and assisted with their planting. They have done well, and the Cemetery staff cleared more ground, so that in 1999 we ordered another batch of plants from Martin Rickard - a very nice, well grown batch of Polypodiums. Most of these are doing well but one or two seem to have disappeared, probably not due to theft (so far). As we fill up the areas cleared by the staff, so they clear a bit more ground. I have bought plants from various sales and garden centres. Many of my own ferns have been operated on to get more and more plants, and last October, James came over to help dig up quite a large batch of all sorts of species and varieties I have been growing on the allotment especially for this project. We had them planted at York within a couple of hours of digging them up thanks to the hard work put in by Julia who has done whatever she has been invited to do, such as planting, digging, weeding and catering.

The ferns were growing so well in 2002 that several had to be split. Soon we shall be able to provide potted specimens for sale in the cemetery flower shop. So far I should think that about two thirds of the job is done. Things are looking very good, but we still need another couple of hundred plants, so if anyone would like to help please let Jack, Julia or Azu know.

The cemetery is open to the public and there are many peaceful walks around other gardens, one based on the garden-graveyard in the nearby village of Bolton Percy, another full of aromatic plants for the blind and a butterfly border of Buddleias. Some influences may be due to the fern hunting Backhouse family who used to keep a large nursery and rockery construction business in York. However, the Backhouse family were not buried in York Cemetery but in the Friends' Cemetery, next door, for they were Quakers. There are 49 Backhouse burials not far from our fernery.

We thought that everything was going along well until late summer of 2002 when James dropped one almighty bombshell. He was going to leave Yorkshire to live in the far north of Scotland. I mentioned this to one of our new members - Azu Fletcher who had recently moved from Harrogate to a village near York and she immediately said that she would try to take over where

James had left off. She has been true to her word and has already been several times to help with weeding and planting.

Then I thought back to the opening of the heather bed reported earlier and I mentioned to James that it would be good to have an official opening of our site even though it is not completely planted. He agreed that it was a wonderful idea, but time was getting short as winter was drawing near. It was now the end of September, so we had to get invitations out soon or the ferns would be past their best. James and I divided the work accordingly. He would approach people from the city and university and I would see to those on the west side of York to get as many interested people to come to this official opening, which was to be on Tuesday, 22 October 2002.

PHOTO: JIM SPRIGGS

My old friend, writer, broadcaster and gardener Mr Geoffrey Smith very willingly agreed to do the official opening and on the appointed day he picked me up from home and we travelled to York together.

This sounds simple enough, but the day before the event, James rang me and said that his father had died and he would be unable to attend. Azu was in Australia, so Julia had her work cut out as she was in charge of catering, and I was landed with all the rest of the work.

During the previous week, James had arranged for the Lord Mayor and Lady Mayoress of York and the Sheriff's lady to attend the function, so correct protocol had to be kept. The Mansion House provided printed guidelines about how to address them etc. and he had wisely sent me a copy so that speeches could be correctly composed in advance.

Forty-one visitors turned up, plus the three civic dignitaries and Geoffrey Smith, and they were assembled outside the chapel ready for the grand opening ceremony when it began to rain and the assembly moved quickly inside where the chairman of the Cemetery Trust greeted the Lord Mayor and his companions. The Lord Mayor answered to the greeting, saying, among other things, that he had never been to this cemetery before and that he was very pleased to be taking part.

After this, in spite of torrential rain, we all moved down to the fernery where Geoff and I endeavoured to deliver our speeches, but the noise of rain on the canopy of umbrellas made it near impossible to hear what was being said. After curtailed speeches, our four guests performed hurried ceremonial fern plantings in pre-dug holes provided by Geoff and Julia Wilkins, which were rapidly filling with water.

There followed a quick walk back to the chapel where Julia, assisted by two of her friends, had laid out a very impressive array of sandwiches, rolls, scones, cakes and the very welcome cups of tea. The company forgot all about their soaking and tucked into these refreshments, and we all enjoyed a good old-fashioned natter. The Lady Mayoress thanked me for everything and said that she had enjoyed herself, as did the Lord Mayor who also said how he appreciated being present at this special occasion. Then the Sheriff's Lady expressed similar sentiments and expressed her particular interest in ferns.

Geoffrey Smith presented a potted fern to each of the caterers and their voluntary assistants to show our gratitude, and Mr. Smith, who had generously waived his usual fee, received a couple of bottles of decent wine and a potted fern for his garden.

We thank the BPS for helping to finance this opening event. But was the event worthwhile from the BPS point of view? Well, York Cemetery was very impressed by the attendance of so well known a gardening expert and is now aware of the value of this secluded corner. A large number of York people have become aware of a local fernery and the delights of ferns. The ladies of the civic party showed such a keen, we sensed latent but unfulfilled, interest in ferns that we arranged to meet them with the Lord Mayor at York Mansion House a few days later so that we could talk to them privately and in more detail about ferns, as well as present them with some choice plants for their own private gardens.

PHOTO: JAMES MERRYWEATHER

Jack Bouckley and Julia Wilkins explain the finer points of royal fern culture to the Lady Mayoress of York.

It was also very gratifying to see a small crowd of students from Askham Bryan College of Horticulture and Agriculture who had come to witness this occasion together with their tutor Dr Phil Orton and Lynne Grey who, with Azu, has been developing methods of fern micro-propagation (*Pteridologist* 4(1), 2002). The College has since joined the BPS and is creating its own fernery!

Jack addressing the brave few who scorned the shelter of the chapel.

PHOTO: JIM SPRIGGS

NEWS & COMMENT

"POLYSTACHION"

In the last issue of *Pteridologist* I reported finding an odd form of *Equisetum palustre*, first described by John Ray in the 1700s. I asked if anyone else had seen it and, even before publication, I met a couple of members of the Leeds and District BPS regional group who knew it well from several sites, including a ditch at a place with which I used to be familiar, Baildon Green, near Bradford and also sand dunes somewhere unspecified.

Rose Murphy wrote from Cornwall: "We have two sites for it - one is a marsh near china clay works on the outskirts of St Austell (SX05) and one by a dune-slack pond on the Penhale dunes near Perranporth (SW75)." Both reports seem to suggest a fairly wide habitat range, but sand dunes crop up in both.

Pierre Martineau, who sent a pressed shoot from Québec, says: "This type of horsetail can stand up to 50 cm. The rhizome grows in water-saturated soil. Smaller lateral cones reach maturity at the same time, but after the terminal cone [*something I failed to note about my Yorkshire specimen, but it is indeed so - ed.*]. The more conventional *monostachion* form grows on dry soil away from the pond and has fewer branches. The two varieties barely interpenetrate".

Alison Paul reports that: "There are well over 80 British specimens of this form of *E. palustre* in the herbarium at the Natural History Museum, London. These were collected throughout the country during the nineteenth and twentieth centuries. Inevitably people tend to collect specimens that are out of the ordinary, and therefore in a herbarium the proportion of unusual specimens can be high. However, it does suggest that this form is not particularly uncommon. A quick search of the herbarium also revealed polystachions from a wide range of European countries, north Asia and north America".

Finally, Anthony Pigott supplied satisfactory answers to all of my original questions: "*E. palustre* f. *polystachion* isn't that uncommon. It's mentioned in several of the Victorian fern books (Newman & Sowerby for example), but doesn't seem to appear much in modern accounts. It used to grow in my garden at Hertford. I did some transplant experiments and it always reverted to the normal form. Therefore, it appears to be environmentally induced rather than genetic".

So, what is the environmental trigger that causes the "polystachion" condition?

James Merryweather

BOOK REVIEW

NEW ZEALAND FERNS AND ALLIED PLANTS

Patrick J. Brownsey and
John C. Smith-Dodsworth

Second edition 2000. Hardback. 168 pp., 216 colour plates. ISBN 1-86953-003-9. David Bateman Ltd, P.O. Box 100-242, North Shore Mail Centre, Auckland 1330, New Zealand. NZ$89.95 + NZ$27.35 p&p (outside New Zealand approx. £31 + £10).

No-one visiting New Zealand could surely fail to notice and be impressed by the ferns. They are abundant and a feature of every habitat. New Zealand's national emblem is a fern, and ferns feature on New Zealand coins and bank notes. Such a country deserves a good up-to-date fern flora, and this excellent book, first published in 1989, fulfils that role. It is a well illustrated, clearly presented, comprehensive and accurate account of the pteridophytes of New Zealand and the outlying Kermadec, Chatham, Snares, Auckland, Antipodes and Campbell Islands.

The first section of the book consists of a clear introduction to pteridophytes, their structure, life-cycle, hybridisation and classification.

The bulk of the book comprises an account of all the 194 native and 32 introduced species of ferns and fern allies. It follows a systematic arrangement of families and genera, so much more useful than the alphabetical approach so frequently adopted. Hybrids are neither described nor listed, but the reader is referred to other sources of more detailed information. There are keys to the genera of fern allies and ferns, and keys to species for most genera represented by more than three species. Maori names and English names used in New Zealand are given. Only the most important synonyms are included. For a full synonymy the reader is directed to another publication; this would have made a useful appendix. Brief, user-friendly descriptions of the main diagnostic characters of families, genera and species are followed by notes on habitat and distribution in New Zealand and worldwide. Attention is drawn to important distinguishing features, variation and particular nomenclatural points, and tips on cultivation are included.

Virtually all species are illustrated by one of the excellent colour photographs that occupy 36 pages in the centre of the book. Additionally, throughout the text there are black and white close-up photographs, numerous frond silhouettes and useful line drawings illustrating features such as scales, venation and sori, all accompanied by a scale-bar.

The book concludes with a useful glossary, an extensive bibliography, a map of North and South Islands showing localities mentioned in the text, and an index to all cited names.

The text has been significantly revised and updated for this second edition. Additional Maori names and bibliographic references are included and distributions revised. Twelve supplementary species, mostly introductions, are described and there are ten name changes, reflecting the ongoing study of New Zealand ferns; two species remain unnamed. In line with current thinking, Nephrolepidaceae and Oleandraceae have been separated from Davalliaceae. However, some trends have not been followed; for example, *Huperzia* and *Lycopodiella* are still included in *Lycopodium*, whilst *Phyllitis* remains segregated from *Asplenium*. The colour plates remain largely unchanged. The photographs of a few species have been replaced with more useful shots and two new colour illustrations feature on the dust jacket. On the whole the colour reproduction has been improved, though a few plates appear rather blue-tinged. I prefer the white rather than the original black background to the plates. The black and white photographs are less contrasty than in the first edition and are thus clearer.

This book is intended primarily as an identification guide; it serves this purpose admirably and will be equally useful to the professional botanist, amateur naturalist and fern grower with an interest in New Zealand ferns. I recommend it wholeheartedly.

Alison Paul

NEWS & COMMENT

CYSTOPTERIS DIAPHANA FOUND IN CORNWALL

It is not often we read about exciting fern discoveries in the general botanical press, but a recent edition of *BSBI News* (No. 93, April 2003) contained a surprise, sent in from Cornwall by Rose Murphy.

It seems Matt Stribley discovered a few plants of a fern he at first thought were *Cystopteris fragilis* growing in rocky recesses on a woodland bank by the River Camel at Polbrock Bridge, south of Wadebridge.

PHOTO: MATT STRIBLEY

C. fragilis does grow in the region, but is not particularly common. This fern did not exhibit all the characteristics of the familiar British species, so these finds generated more interest than they might otherwise have done. Other members of our lively BPS Regional Group in Cornwall visited and increased the count to some thousands of plants.

Closer examination revealed that the spores had spines that were not typical of *C. fragilis*, many of the pinna veins ended with U-shaped depressions and, anyway, the habitat was entirely wrong. The underlying rock is Staddon grit, with little limestone in the vicinity, and the atmosphere of these still woods is very humid.

The Cornish pteridologists were right to suspect their *Cystopteris*, for specimens sent to the NHM were identified as *C. diaphana* (syn. *C. viridula*), which has so far been found in Corsica, France, Italy, Portugal, Sicily, Spain and in the Azores, but never before in Britain.

Is this fern an overlooked native in its most northerly outpost or an imported alien? We have only this preliminary news so far and a fuller report will appear in due course in *Watsonia*.

Contact: Rose Murphy, Reskadinnick, Camborne, Cornwall TR14 0BH

Writing about rusty-back fern, Edwards (*The Ferns of the Axe*, 1866) includes this ditty from *Pharmacopaea Officinales* (Quincy, 1736) :

Asplenium ceterach

Great Dioscorides relates,
If pluckt in open weather,
This herb a swollen *spleen* abates,
Nay, if for forty days, saith he,
You drink it steep'd in vinaigrè
Removes it altogether.
Ye *spiteful* souls, its virtues try,
One thing well nigh I had forgot,
That when the vinegar you buy,
In using, make it boiling hot.

Rusty-back fern

[Greek physician Pedanius Dioscorides (*c.* 40-90 A.D.) was from Anazarbus, a small town near Tarsus in what is now south central Turkey. As a surgeon with the Roman army of Emperor Nero, Dioscorides travelled widely, recording the medicinal value of hundreds of plants. He compiled an extensive listing of medicinal herbs and their virtues in about 70 A.D. This herbal *De Materia Medica*, remained the authority on medicinal plants for over 1500 years.]

BPS MERCHANDISE

We have new people obtaining, creating and selling BPS merchandise. Their new order form is enclosed with this edition of Pteridologist, *but here is a little about Bryan and Gill.* *ed.*

We live in Lowestoft, the eastern-most place in Britain, in East Anglia - a dry area not renowned for its ferns unless you count the lovely *Dryopteris cristata* and the marsh-loving *Thelypteris palustris*. Our interest in ferns began in 1996 with a tiny article in the *Radio Times* showing how to grow ferns from spore. Not being aware of the BPS, it took us a long time to find fern spores in any shops or seed catalogues, Thompson & Morgan being the only one in the end. Later that year, a trip to New Zealand with all its forests of tree ferns whetted our appetites further still. But it wasn't until we visited the BPS stand at the NEC Gardeners' World in June 1997 and met a helpful Matt Busby that we joined the Society. As luck would have it, the local East Anglian branch was holding a field meeting very close to Lowestoft soon after and that began our long association with the friendly bunch of East Anglian 'fernies' (and later South-East branch and National members) under the enthusiastic leadership of Barrie Stevenson. Our role as BPS Merchandise managers began in June 2001 when Mick and Linda Craddock decided to hand on the mantle. Indeed, our job was made all the easier by Mick and Linda's meticulous notes and instructions passed on with the merchandise stock.

So, what merchandise does the Society sell? Well, we don't do any books (which rest in Steve Munyard's very capable hands), but the full range is given in the latest merchandise list, which has expanded to 2 sides of A4 (actually, 1 side of items and 1 side of order form!). It includes bookmarks, lapel badges, ties and car logo stickers. On the clothing front there are dark green tee-shirts, polo-shirts and sweat-shirts, all with the BPS logo in gold and, as a new venture, some now have embroidered logos instead of ironed-on ones. For those wishing to put pen to paper, there are notelets and post cards featuring reproductions of Henry Bradbury's nature-printed ferns and, another new line, greetings cards with reproductions of delightful fern watercolours by Anne Wright. Last, but by no means least, there is the new BPS bone china mug with a wrap-around fern again by Anne Wright and produced by the very collectable Great Yarmouth Pottery (some of whose pieces fetch hundreds of pounds!).

Hopefully, by the time you read this, a copy of the price list will be on the BPS web site, or you can use the one enclosed with this issue of *Pteridologist*. We are always on the lookout for ideas for new items and hope to have some more next year (perhaps pens and towels), and if there is anything of a ferny nature you fancy, please get in touch either by e-mail, letter or 'phone.

Bryan and Gill Smith
Contact details inside back cover

GROWING FERNS

FERNS IN MY GARDEN - *Ophioglossum vulgatum*

Jack Bouckley

In the 1989 edition of *Pteridologist* (1(6): 239) I wrote an article about growing of *Ophioglossum vulgatum* from spores. The following years have been very interesting as the plant has been almost lost on a couple of occasions.

Let us start in 1989. My little treasure, raised from spores in 1980, was growing very nicely in a spot on the northwest side of a greenhouse and the plot was watered most of the time with rainwater directed from the roof of the greenhouse, and was sheltered from the summer sun by a honeysuckle plant. I was happy about this mainly because the plant was happy. But, I think it was in 1991, a gale demolished the greenhouse, leaving my adder's tongue without shelter from the sun from early morning until about 15.00 h, but more importantly the natural supply of water had also gone. Temporary shading was fixed up and irrigation had to be done by hand. All went well the following year but in 1992 things started to go downhill. Only about half a dozen fronds appeared and none of them was fertile.

The next year the poor thing looked really sick so I decided to dig it up and try to grow it in a pot. All went well and the whole plant seemed to recover before dieback time. It was kept in the pot until the next growing period when it looked the unhealthiest plant I had ever seen. I had been troubled with a very nasty infestation of vine weevil in the garden. Could the condition of my plant be blamed on these little pests? I do not know, but one thing was certain, a new place had to be created if it was to survive.

By this time another greenhouse had been erected in my garden in a different place from the one which had been destroyed. The rainwater from one side was directed into a wildlife pond and the water from the other side went into a patch of ground where nothing had been grown (except for a few weeds) and it was there that I decided to plant my adder's tongue. Apart from the soil being full of fungi, it was also sheltered from sun from about 11 O'clock onwards, so this was dug with plenty of pulverised bark where I am certain that I will eventually be rewarded with a very good patch of this fern. Each year since planting it has produced more fronds and in 2002 there were two fertile fronds as well.

If the weeds seem to be getting a bit out of hand they are cut off at ground level so that the roots are left in the ground to rot.

This fern is definitely not the easiest of ferns to grow and it certainly is not the best looking of plants, but what a load of satisfaction there is to see it peeping through the soil at the appointed time

The photograph was taken by Azu Fletcher in 2002, after I had removed one of the fertile fronds for an experiment to grow it using an Agar culture method. There is no sign of any prothallus at the time of writing, February 2003, but after all, I waited for seven years in the 1980's so there is plenty of time yet.

PETER HAINSWORTH'S FERNS

Open gardens specialising in ferns are few and, it was reported to the BPS committee recently, getting fewer. We, therefore, welcome the decision of Attadale Gardens in northwest Scotland to add ferns to their established collections of *Meconopsis, Primula*, *Rhododendron* and *Azalea*. Some time ago, Martin Rickard was asked to supply a few tree ferns and other exotics which have settled in well alongside extensive natural displays of native species. In 2003, the collection is set to expand hugely.

This winter, a sequence of fortunate coincidences brought Attadale's owner, Mrs Nicky Macpherson, and head gardener, Geoff Stephenson, closer to realising their ambition that they should have a top fern garden, when it was discovered that the late Peter Hainsworth's ferns needed a home. Those who knew Peter (1920-2001) or read occasional articles in *Pteridologist* about his private research will know that he was a great plantsman and a skilful grower. His enchanting woodland garden in northwest Scotland at Achnashellach is only a few miles from Attadale, sandwiched between the picturesque Glen Carron railway and commercial forest on the lower slopes of his favourite mountain Fuar Tholl. It is acknowledged by the few who have seen it to be the equal of many larger professional gardens, and it is packed with ferns - even in the vegetable garden - as well as Hostas, Trilliums and the many other plants that interested Peter.

With the agreement of the Hainsworth family, a small team of gardeners has begun to transfer Peter's ferns to their new home on the eastern shore of Loch Carron, where visitors and enquiries are always welcome:

Attadale Gardens, Strathcarron, Wester Ross IV54 8YX. 01520 722217 - www.attadale.com

A fuller report will be presented in a future issue of *Pteridologist*.

THE FIVE BEST FERN SPECIES FOR CULTIVATION IN THE BRITISH GARDEN?

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In recent years there has been a revival of interest in growing ferns in British gardens. Many gardeners favour exotic species or the horticultural cultivars with abnormal morphology so favoured by the Victorians. However, the normal forms of native British species have much to offer the gardener. Most require little attention; several cope with difficult shady conditions. They soften hard landscaping and add texture and varied shades of green to borders. In natural plantings, they can provide a link with natural vegetation beyond the garden boundary. Some fern enthusiasts will grow any and all British fern species in their gardens out of interest, sometimes in borders dedicated to ferns, but others will have space only for those that earn their place by their appearance and horticultural characteristics as components of mixed borders.

An individual choice will be partly a matter of personal taste but will be also influenced by the location and cultural conditions of each garden. My choice is based on experience in a garden of about two-thirds of an acre at about 150 m (*c.* 500 ft) altitude on the outskirts of Edinburgh (NGR: Landranger 66; 165 670). The soil is circum-neutral, pH 6-7, varying from deep alluvial soil to clay sub-soil exposed on a steep slope, and in many parts of the garden it remains moist even in the summer. Recent records for a climatological station about 2 km (1.5 miles) distant indicate that annual precipitation is about 1,000 mm (*c.* 40 ins). Thirty-year averages for Edinburgh show that precipitation is fairly evenly distributed through the year, the wettest months being July and August, and the driest being February to May. However, in the last three years, some months (notably April 2000, October 2002) have had an uncharacteristically high rainfall.

Most of the ferns are on, or at the foot of, a south-east facing slope, some under several large deciduous trees and some in the open, though only in direct sun for part of the day because of the effect of the slope. Some are exposed to the prevailing southwesterly winds and can be damaged by gales. Ferns at the bottom of the slope are in a frost hollow and have occasionally been subjected to temperatures as low as -18° C, though rarely below -10° C in the recent unusually mild winters. Frosts can occur as early as mid-October and as late as mid-May. Snowfall rarely exceeds about 20 cm (8 in) and rarely lies for more than a week or two at a time, but can be enough permanently to flatten fronds of species that are borderline winter-green, like *Polystichum setiferum* and *Dryopteris dilatata*.

Of 41 native and naturalised British species tried in the garden, 35 have grown well for ten years or more without winter protection or any other special treatment. The absence of extreme conditions of pH, moisture or temperature allows 28 native species to thrive together in the same 12 x 2 m border in moist soil at the foot of the slope and exposed to direct sunlight for part of the day. Here, within an area 3 x 1 m, calcifuges including *Blechnum spicant, Cryptogramma crispa, Dryopteris aemula*

Phegopteris connectilis (centre foreground) makes attractive ground cover, here surrounded by (left to right) *Gymnocarpium dryopteris*, *Polystichum setiferum, Dryopteris dilatata*, and *Matteuccia struthiopteris*. *D. affinis* and *D. filix-mas* are on the slope in the background.

and *Oreopteris limbosperma* grow with calcicoles including *Cystopteris fragilis, Dryopteris submontana, Gymnocarpium robertianum* and *Polystichum aculeatum*.

In making my choice of garden-worthy species, I have excluded consideration of the morphologically deviant horticultural forms for which *Athyrium filix-femina, Dryopteris affinis, Asplenium scolopendrium* and *Polystichum setiferum* are particularly renowned. Other species such as *Adiantum capillus-veneris*, *Anogramma leptophylla*, *Asplenium marinum*, *A. obovatum* subsp. *lanceolatum* (= *A. billotii*), *Botrychium lunaria*, *Hymenophyllum tunbrigense, H. wilsonii, Ophioglossum* spp. and *Trichomanes speciosum* (available only as gametophytes) were excluded from the list because they don't survive in this garden without winter (and sometimes summer!) protection and/or other specialised conditions. *Asplenium ruta-muraria* and *A. viride* were tried after augmenting the surrounding soil with old mortar or limestone chips but failed to survive beyond the first year, even though the former is growing naturally on neighbouring walls. The jury is out on *Polystichum lonchitis*. After growing well for several years and making a handsome addition to a rock-garden, the single plant I have has lacked vigour during 2002, a very wet year; despite being planted on a sloping site. Perhaps the drainage is nevertheless inadequate.

Also ruled out of consideration is *Pteridium aquilinum*, not because it is difficult but because of the potential consequences if it grows too well. However, I do have it in my garden, because I consider that the much-divided frond is in its own way attractive and has interesting features. It is, for example, the only British species with nectaries. I have chosen what is, and I hope will remain, a smaller and less vigorous form from Perthshire (subsp. *fulvum* according to C.N. Page) and I grew it first in the shade of trees in an out-of-the-way corner. Having found that after several years it had not spread significantly, I am now trying some in a more open site but still well away from the main borders. A small compact clump is slowly establishing but the nearest naturally-occurring bracken is about 1 km away and conditions in the garden may not be entirely to its liking. Nevertheless, I shall not risk it as a border plant.

All the other species that have been growing vigorously for several years without any special attention were then considered on the basis of the characteristics displayed in my garden. Of the larger species eventually rejected, *Dryopteris filix-mas* is a rapidly growing fern that makes a dense, maintenance-free, ground cover useful for stabilising slopes, whether open or shady, damp or dry, but it lacks elegance and is unattractive in autumn and winter unless very sheltered. It is very tolerant of splitting and moving and can also be propagated from "self-seeded" volunteers that arise all over the garden. Indeed, it establishes so readily from spores that it almost attains the status of a weed. Young plants rapidly form multiple crowns, thus obscuring the shuttlecock form of single crowns. It looks its best as a component of a woodland garden or among shrubs, but with fronds up to 120 cm (*c.* 4 ft) high or more, it can smother neighbouring plants in smaller herbaceous borders and, if planted as individual specimens, it rarely has the visual interest to justify its selection.

D. affinis is rather similar, but some forms have neater and more winter-green fronds and can make good specimen plants. I have one individual of unknown origin (perhaps *D.* x *complexa*, a hybrid of some form of *D. affinis* x *D. filix-mas*) that forms a bold shuttlecock of densely 'leafy' fronds 120 cm (*c.* 4 ft) long and up to 30 cm (*c.* 1 ft) wide with a ruffled appearance due to the pinnae and pinnules lying at an angle to the plane of the frond. It grows well in deciduous tree shade and would be a candidate for a 'Top Ten' rating if propagated. Another plant of *D. affinis* (a triploid apomict with many but not all of the characteristics of the so-called morphotype *borreri*) that I raised from a spore 40 years ago is now some 190 cm (*c.* 6 ft) high (4' 6" fronds on a 1' 6" "trunk") with a spread of over 240 cm (*c.* 8 ft) and this plant is a striking feature in a border with shrubs and other ferns, especially during the autumn and early winter. The more golden forms of *D. affinis* (mine has many but not all of the characteristics of the so-called morphotype *affinis* or *paleaceo-lobata*) can look very attractive in late spring as the new fronds expand and plants are easy to grow but are otherwise unremarkable.

D. dilatata, with its large open shuttlecock of dark green finely dissected fronds, is more attractive than most other native *Dryopteris* species as a foil for herbaceous angiosperms. It has been grown as a garden plant and introduced as such outside its native European range and as far afield as the Falkland Islands (Broughton and McAdam, 2002). However, the fact that it is so familiar (it is the most abundant woodland fern in the wild in northern Britain) was one of the reasons it did not feature in my 'Top Five'. It is also said to be more demanding, disliking both drought and poor drainage, although it has self-sown in various parts of my garden. *D. aemula*, *D. carthusiana, D. cristata, D. expansa* and *D. submontana* have each proved easy to grow in two or more places in the garden and have their individual subtle charms, but they make limited impact in the summer and little or none in the winter. *O. limbosperma* has grown wherever I have put it. It is superficially like *D. filix-mas* and is similarly attractive in a woodland setting or shrub border. The unusually yellow-green fronds have the added bonus of scent, but it has no other advantages over *D. filix-mas*, and loses its fronds much earlier in the autumn.

A. filix-femina is easy to grow throughout the garden and is one of the more attractive large species with its delicately divided fronds. Self-sown volunteers appear often enough to provide a source of new plants but not often enough to be a troublesome weed. It looks good in a woodland or mixed herbaceous setting, but in my garden the fronds grow to over 120 cm (*c.* 4 ft) and within a few years plants can be too large for smaller borders. However, the main disadvantage is that it is one of the first species to senesce, in October, so that fully expanded green fronds are present for less than five months of the year. An equally attractive large fern is *Polystichum setiferum,* which is another fern that looks good with shrubs or other herbaceous plants. The 120 cm (4ft) fronds are larger than those of *P. aculeatum* and it tolerates drier sites better than most ferns, but although it forms a larger plant, the individual fronds are not so striking as those of *P. aculeatum* and it is less reliably wintergreen. It has proved easy to grow but has not 'self-seeded' in this garden. Both *A. filix-femina* and *P. setiferum* would be in my own 'Top Ten'.

Among the smaller species, *Asplenium adiantum-nigrum* can make a handsome rock-garden plant in open conditions but may be slow to establish especially in neutral to acid soils. *A. trichomanes* subsp. *quadrivalens* has proved easy to grow and it 'self-seeds' in dry-stone retaining walls, but at some sites tends to shed pinnules and look untidy much of the time. *Asplenium ceterach* is an attractive small

winter-green fern, interesting because of its ability to 'resurrect' after drought. Most familiar as a coloniser of mortar in old walls in the west, in my garden my one plant has grown well, if slowly, in the soil of a dry-stone retaining wall but has not produced any self-sown offspring. *Athyrium distentifolium* (including its variety *flexile*) has the delicate appearance of *A. filix-femina* and its smaller size makes it more suitable for growing among herbaceous plants like *Hosta,* but, like *A. filix-femina,* it is one of the first ferns to lose its fronds in the early autumn. Some other species are of considerable interest because of their biology (*Pilularia globulifera*, at the pond margin) or rarity (*Asplenium septentrionale*, *Woodsia alpina,* and *W. ilvensis*, in a sink and in a rock garden) but have limited visual impact.

Thelypteris palustris (syn. *T. thelypteroides*) has no outstanding characteristics other than its preference for very wet conditions, making it a successful spreading ground-cover for bog gardens and waterside positions. For the first ten years or so that I grew it, it produced no fertile fronds, and still produces only a few. *Onoclea sensibilis,* the American sensitive or oak fern, is another wetland species; it is not native but naturalised in several places in southern and western Britain. It produces attractive sterile fronds from a branching underground rhizome and has a reputation for spreading rapidly in gardens but in my garden is well behaved. However, it also rarely produces the distinctive fertile fronds and it is the one of the first species to lose its fronds in the autumn, even before the first frost. *Gymnocarpium dryopteris*, the British common oak fern, provides an alternative to *Phegopteris connectilis* as a ground-cover or front-of-border plant and the dainty young apple-green fronds can be very attractive, but it is less robust and less resistant to weather damage and, in my garden at least, slower to spread. *G. robertianum* is a little more durable and vigorous, even without additional lime, but less striking as a garden plant.

The three *Polypodium* species have the considerable advantage of being reliably winter-green and weather resistant, and they can spread to form an attractive cover over dry earth banks, rotting logs and rocks where it might be difficult to establish other ferns. The glossy pinnate fronds are not unattractive and merit a place in the 'Top Ten' but are not in my 'Top Five'.

Cystopteris fragilis spreads readily by self-sown spores and is the first species to flush in the spring, though there is considerable variation between different forms. This year (2003), the first frond on a typical form was fully unfurled by 1st April. Another form, with rugose spores and thus by some considered to be *C. dickieana*, reached this stage by 3rd March. Typical *C. dickieana* (= *C. fragilis* var. *dickieana*) of the form originally described is later; the first fully unfurled frond was not seen until 20th April. It forms attractive dense clumps of 'leafy' dwarf fronds in a surprisingly wide range of garden conditions, despite its very restricted natural habitat. It is easy to propagate by splitting (though curiously does not seem to spread in the garden by spores) and is arguably a more attractive addition to a rock garden than the typical *C. fragilis*. Whether or not it should properly be considered a separate species or a distinct morphological form of *C. fragilis* (Dyer, Parks and Lindsay, 2000; Parks, Dyer and Lindsay, 2000), it has the added interest of being extremely rare in the wild. It occurs in only two isolated populations in neighbouring sea caves on the northeast coast of Scotland. It is another 'Top Ten' fern but, like all forms of *C. fragilis*, it is deciduous and, in all but the shadiest sites, the first to lose its fronds, even as early as August, though another late flush may follow.

My final choice of the 'Top Five' garden-worthy British native or naturalised fern species is listed below. All can be raised from cultured spores but some can also be propagated vegetatively or from naturally dispersed spores producing 'volunteers' in damp shady corners around the garden. I have seen all of them for sale in garden centres within the last year. It is interesting to note that 4 of the 5 are included in the RHS Award of Garden Merit list for 2000 and 2001 but, although their criteria are broadly similar to mine, *Phegopteris connectilis* has not found favour (Wardlaw, Wright & Wright, 2002). BPS members may be more enlightened; they have requested spores of four of the species, including *P. connectilis,* from the Spore Exchange (the short-lived spores of *Osmunda regalis* are only available by special arrangement with a BPS member). However, none features among the 24 ferns most requested from the BPS Spore Exchange; of the six native ferns on the list of the most popular spores, several seem to have been chosen because in the wild they are rare or restricted in distribution.

Fig. 1. The stiff, spear-shaped fronds of *Polystichum aculeatum* in an open shuttlecock attract attention in a border.

DYER'S 'TOP FIVE'

1. ***Polystichum aculeatum*** **Hard Shield Fern** (Fig. 1). The fronds are architecturally more striking than those of almost any British native species, and are arranged in pronounced open shuttlecocks. With fronds up to 100 cm (*c.* 40 ins) long, the species is large enough to be a feature in a border of small- to medium-sized herbaceous plants. The winter-green fronds are glossy dark green, resistant to weather damage and disease, and attractive all-year-round. It is not the fastest developer and does not spread vegetatively but this has the benefit of maintaining distinct separate crowns for several years. It grows well in sites which never receive direct sunlight, but also tolerates more open positions. It is less happy in very wet sites and I haven't tested it in more acid soils but it is otherwise not difficult to grow and can provide occasional "self-seeded" volunteers from spores. A well-grown specimen in moist but well-drained soil has the "Wow!" factor; in this context, this means that it not only causes fern

enthusiasts to pause and enjoy it, it attracts the attention of visitors not previously aware of the possibilities of ferns as garden plants.

2. ***Matteuccia struthiopteris*** **Ostrich Fern** (Fig. 2). A native of damp sites in northern Europe and USA, this fern is naturalised in Britain. The large sterile fronds, more than 150 cm (*c.* 5ft) long in my garden, form handsome bright green shuttlecocks in summer. The fronds are densely 'leafy', with short stipes and few spaces between the pinnules, and upright in a perfect circle around the crown, so the resemblance to a shuttlecock is particularly striking. In late spring, each partially unfurled frond resembles an ostrich tail-feather, hence its common name. Later in the summer, shorter green fertile fronds appear in the centre of the shuttlecock.

Fig. 2. The strikingly different fertile fronds in the centre of the shuttlecocks of *Matteuccia struthiopteris* provide added interest.

The sterile fronds are deciduous and, after an attractive show of autumn colours from brown and yellow to white, collapse and decay. This is one of the first species to lose its fronds, even before the first frost in mild autumns. By that time, the fertile fronds have turned brown and woody and remain an attractive feature through the winter, often standing conspicuously above snow, and well into the next year. In this way, the ostrich fern provides all-year-round interest. The species is easy to grow in moist conditions and is tolerant of waterlogging. In suitable sites, it spreads rapidly, forming new crowns at intervals along thick black rhizomes growing horizontally just below the soil surface. This makes it easy to propagate vegetatively (spores are relatively short-lived), but it can be invasive, requiring control by removing the spreading rhizomes. A clump of tall shuttlecocks in the right setting can have the "Wow!" factor during the summer, and the "What's that?" factor in the winter. It also makes a handsome pot plant in a large container, given sufficient watering.

3. ***Asplenium scolopendrium*** **Hart's Tongue Fern** (Fig. 3). This relatively common calcicolous native fern can be grown in soil but establishes particularly well on moist walls, banks and rock-faces. It bleaches in direct sunlight but makes up for this by thriving in the shadiest conditions and in north-facing sites. The striking glossy green undivided medium-sized leaves are winter-green though can be damaged by severe weather. They especially come into their own in the winter when surrounding vegetation dies down. It may not always have the "Wow!" factor as single plants but it can form bold dense groups in places where few other plants with equivalent visual winter impact can prosper. In suitable sites, it spreads rapidly and widely from dispersed spores.

Fig. 3. *Asplenium scolopendrium* can decorate a shady corner, especially in winter when other plants have died down.

It appears to be more shade tolerant than *Asplenium trichomanes* or *Cystopteris fragilis*, with which it forms mixed volunteer populations in less heavily shaded positions.

4. ***Phegopteris connectilis*** **Beech Fern** (Fig. 4). This is a medium-sized native fern with attractive triangular blades up to 25 cm long on long stipes (up to 50 cm). A covering of white hairs gives the fronds a soft texture and grey-green colour. Fronds arise singly but close together from spreading branching underground rhizomes to form a dense carpet. The fronds are deciduous but from late spring to the autumn they are very resistant to damage by late frosts and other adverse weather conditions. It grows equally well in deep shade under trees and in more open sites where the fronds receive direct sunlight for the first half of the day. The rhizome spreads fast enough to fill in between plants within a few years but not so fast that it is difficult to contain. Individual fronds may not have the "Wow!" factor but *en masse* they form a particularly attractive summer groundcover of uniform height, colour and texture in front of or around shrubs or other larger ferns with crowns. It is equally successful in the rock garden or among small herbaceous woodland flowers provided that the rhizomes are not allowed to become too dense.

Fig. 4. *Phegopteris connectilis* forming a dense clump at the front of a border.

5. ***Osmunda regalis*** **Royal Fern** (Fig. 5). Perhaps the classic garden fern, this striking native species has been cultivated for centuries and was particularly popular with Victorian gardeners.

GROWING FERNS

The tall, handsome, bold fronds form a shuttlecock round each crown but because the frond is less 'leafy', these are not as striking from a distance as those of the Ostrich Fern; old plants build up massive aggregations of multiple crowns, which can be split to produce new plants. Uniquely among British ferns, each fertile frond ends in a conspicuous tassel of sporangia. Unfortunately the fronds are deciduous and contribute nothing in the winter, although in the autumn they turn from green to glowing gold for a short while before collapsing. It is easy to grow as feature plants in a perennial border provided it isn't too dry but, like the ostrich fern, it also enjoys very wet conditions and can be used for mass plantings in large bog gardens and waterside locations. Unlike the ostrich fern, however, it is never invasive. The spores are very short-lived unless stored in specialised conditions (Hainsworth, 1996), and no 'volunteers' have been found establishing in the garden, though perhaps this would occur in gardens with acid peaty soils. Well-grown specimens have the "Wow!" factor.

Fig. 5. The sporangia formed at the ends of the fronds of *Osmunda regalis* turn brown and persist after the spores have been shed, making this species stand out among other ferns.

It would be interesting to learn of other people's selections. It is likely that different species will be at the top of the list for gardens that are smaller or more formal than mine, and for those with milder climates, low rainfall or distinctly acid or alkaline soils. Some people may be less concerned than I am about all-year-round interest provided that the fern has the "Wow!" factor in the summer. Any fern that finishes in several 'Top Five' lists would be a very special plant indeed. After all, there aren't many native British flowering plants that are widely grown as garden ornamentals.

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PLANT BADGES OF SCOTTISH CLANS

James Merryweather

I was idly leafing through my copy of *Faclair gaidhlig gubeurla le dealbhan* (Dwelly's illustrated Gaelic to English dictionary) when I spotted a small picture of a familiar pteridophyte, the stag's-horn clubmoss (*Lycopodium clavatum*). Interested to see what it was called in Gaelic, I thumbed my way down the close type of desperately unfamiliar words to discover it is Crotal-nam-maddh-ruadh. I also read with increasing interest that it is the plant badge of the Munro and Macrae clans. The Macraes also favour fir clubmoss (*Huperzia selago*), I discovered from Johnston & Bacon's little book about *The Scottish Tartans* (1945).

My imagination conjured up images of plaid-swathed, claymore-waving Scots warriors plundering the braes over the centuries in search of plants from which to fashion traditional buttonholes, in the case of clubmosses choosing what must be generally considered to be rather plain and obscure plants, even if we pteridologists think they're fascinating and beautiful. Were any other lower plants used as badges of the clans? I wanted to know. Why not choose burnet rose, bog-bean or milkwort? Heather has perhaps been overdone. What about an attractive common weed to make so special an emblem: buttercup, daisy or perhaps even a thistle? *Cirsium vulgare* might seem a good choice. Why not a fern? I found it difficult to discover which clans have snapped up which plant species because the dictionary only works one way, Gaelic to English, but I discovered a few by flipping through the pages looking for plant pictures.

For example: Roid, bog myrtle (*Myrica gale*) is the badge of sections of Clan Campbell; Cranach, hare's tail "grass" (*Eriophorum vaginatum*) is worn by Sutherland; Aitionn, juniper (*Juniperus communis*) is favoured by Clans Gunn, Murray, Ross and MacLeod and the Athol Highlanders as well. Guithas, Scots pine (*Pinus sylvestris*) is the emblem of Clan Alpine (presumably forebears of MacAlpine) and the Farquharsons who also, incidentally, wear foxglove *Digitalis purpurea* when it's in season.

At last I found pages 746-747 of Dwelly's hefty lexicon, the hot-spot for ferns, the Gaelic names of which I will refrain from listing for fear of losing the reader's attention, though it is interesting to observe that the list includes rarities, such as *Cystopteris montana*, which you would think few Scottish folk would have encountered, as well as common species, and their names all begin with Raineach or Rainich, which simply means "fern" or "brake". I sense that Raineach also means bracken (*Pteridium aquilinum*), but, again, it is impossible go looking for one word among the millions in a dictionary which only translates one way. I also discovered that a tuft of fern is called Goisean raineich, the useful adjective "ferny" is translated as Rainachail and the royal fern (*Osmunda regalis*) seems to be called more or less what we English call it, Rainach-rioghall (fern-royal).

Some other fern allies have found their way into the Highland culture, but only a few have their own Gaelic names. Ordinary horsetails (*Equisetum arvense*, *E. fluviatile*, *E. palustre*) are dismissed in a batch as Cuilg-sruth-eich whereas the useful scouring rush *Equisetum hyemale* has its own name, Biorag. I'm sure this does not mean "the dishcloth made of biological material". There is a perplexing range of meaning for the two parts of the Gaelic name for maidenhair fern, Failtean-fionn, but among them are the highly appropriate head-dress and pretty female (or fair one).

Creamh is hart's tongue (*Asplenium scolopendrium*), which also has the longer name of Creamh-mac-féidh. "Creamh" is rather non-specific. According to Dwelly, it is also given to elecampane, garlic, gentian, leek and beer! Of the full Gaelic name for hart's tongue we have "Creamh" followed by "féidh" or "fiadh"?, the deer, qualified by "mac" which we recognise from MacAlastair or McDougall meaning "son of" Alastair or Dougal. The adult stag is "damh" but the son of the deer before he becomes a stag, the hart, is, therefore "mac-féidh". *Q.E.D.* (except that the Gaelic hart apparently has no tongue).

I thought I might find a fascinating medicinal parallel in Frith-rainach, the Gaelic name of brittle bladder fern (*Cystopteris fragilis*) but, disappointingly, it turned out simply to mean "little fern".

In *The Scottish Tartans* I did find ferns recorded as plant badges. Bracken (*Pteridium aquilinum*) belongs solely to Robertson, and it seems a more obvious choice than the Munro-Macrae clubmosses. It is widely available if a trifle on the large side for wearing on the person. I failed to write down its Gaelic name before continuing what was at first a rather haphazard search. Could it simply be Raineach? Apparently, the clan Chisholm also has a fern for their badge, but I cannot discover which species, for it is given simply as "fern". There is a picture of it (and of the two clubmosses) but it is evident that the illustrator's appreciation of plant anatomy was worse than rudimentary, so even a rough identification is hopelessly impossible.

How do the clansmen display their chosen plant? The plant emblem is a temporary affair, plucked in the field, when and where available, pinned behind the silver-crested bonnet brooch or sash clasp, or on the lapel of the jacket. I really like this custom, properly steeped in history and culture: permanent as the Highlands and worn with family pride, yet transitory with the seasons. I'm afraid that the recent, highly contrived county flowers scheme has left me cold.

AFTERTHOUGHT Non-botanical publications tend to cite the plant badge of Munro as "common club moss", without the more precise botanical name to facilitate unequivocal identification. It strikes me that the fir clubmoss *Huperzia selago* could also be called "common club moss" in such books, and that it would make a much more convenient plume to decorate the bonnet than the straggly rhizome of *L. clavatum*, unless, like the green willow in the song, it were wound: "All around my hat".

ROBERT DICK, BAKER OF THURSO

Ted Munyard

The Ferns, Hillbrae,
Methlick, Ellon AB41 7HE

After a long day in the garden, I decided to rest a while and my way of doing this was to go on a BPS meeting or two, metaphorically speaking that is. I turned to the 2001 Bulletin. The meeting I enjoyed particularly was the Indoor Meeting held at The Natural History Museum on the 3rd November. I found the reflections on the favourite Fern book presented by the various speakers, quite fascinating.

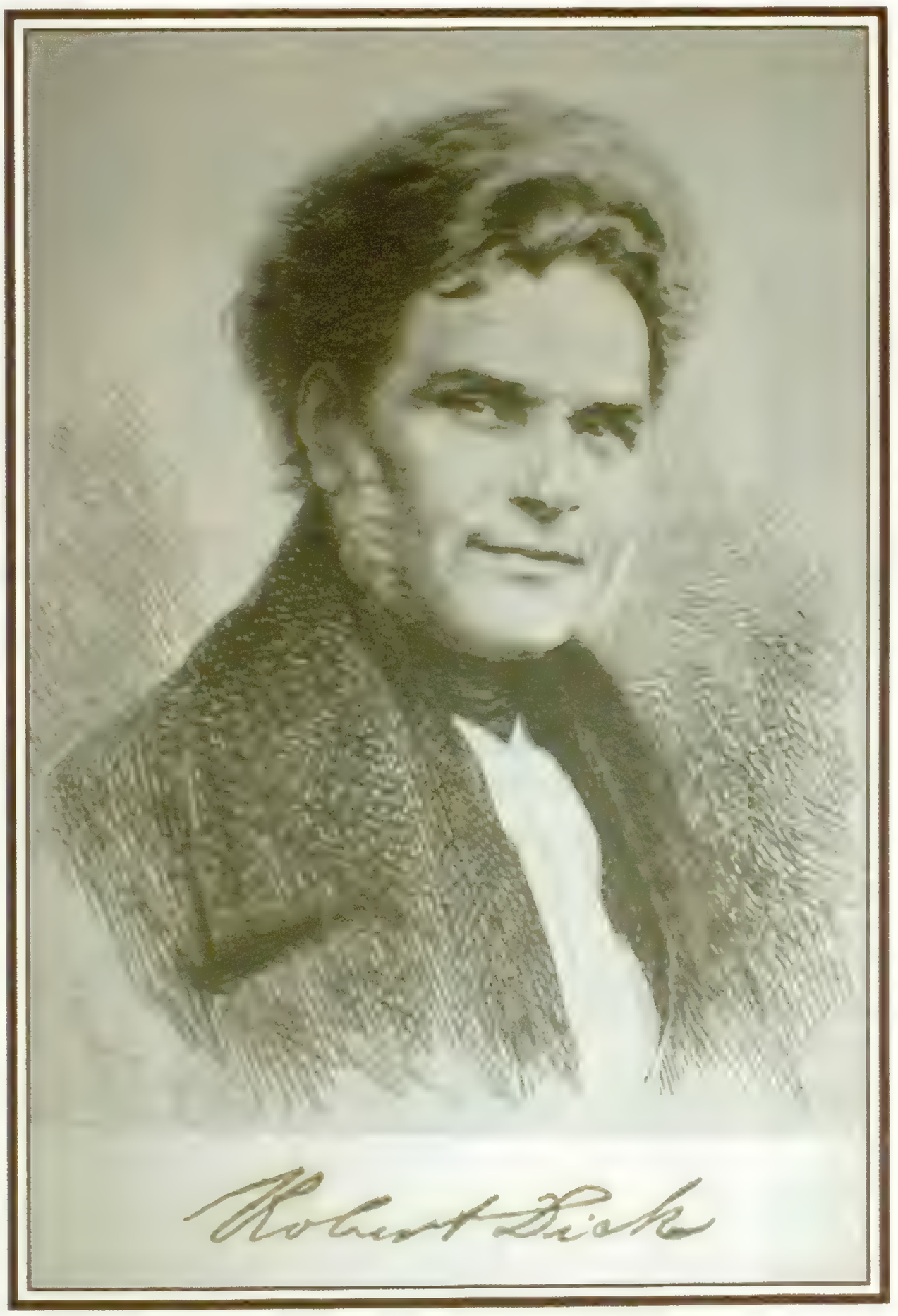
I personally often feel my favourite book is the one I have just finished reading, and this was particularly the case recently when I read a book that my son-in-law inherited upon the demise of his father.

This book, written by Samuel Smiles and published in 1878, is the life story of one Robert Dick, a Baker as well as Geologist and Botanist of Thurso. I have read Smiles before and find his style captivating.

Robert Dick, a name not previously known to me, was one of these men who lived for their study of natural things. As well as a leading geologist of his day, for it was he who supplied Hugh Miller with specimens of fossils which resulted in Miller making many amendments to later editions of *Old Red Sandstone*. Dick was also a great and enthusiastic botanist and it would seem he knew every plant that grew in Caithness and was most energetic in seeking out those that interested him.

The following is from one of his letters, written to his sister at the end of August: "Since I wrote you last, I have managed to walk thirty-six miles. Long, long ago, I chanced to find a Fern eighteen miles up country. It was not new, consequently not a discovery; but it was as good as such to me. It had never crossed me in all my wanderings; or rather I had never found it until then. No one told me where it grew, for the best of reasons. That, no one knew.

"Since I first found it, I have every year gone a-walking to it, just to visit it again and again. This year, I have been there and back. The fern is very small: I enclose a specimen. It is the Rue-leaved, or wall Spleenwort. The rocky spot in which it grows contains many other ferns, some of them not at all common".



As for us BPS members, we climb into our car and drive off to a car park convenient to some ferny location and then walk from there, generally to see something quite rare. This man, a baker who started work around 3 am would set off around 7 am and walked fantastic distances to see a small fern before returning home in time to start work again at 3 am. In another letter he says: "I got home at 3 am Wednesday morning having walked with little halt, for about twenty four hours".

At my most enthusiastic, I would never devote such effort to my interest. To read the account of this man's life inspires me to do great things, but I know I am no longer physically able to realise the things to which he inspires me. I wonder what I might have achieved in the field of botany if I had read this book when I was in my twenties. If you would like to know to what lengths a man will go in the quest for knowledge, you can do no better than read this book, if you can find it.

Some final advice from Dick: "Before I started, I took off my shoes and dipped my feet stockings and all into a basin of water. I then tied on my shoes and set off. When I had gone six miles I came to a burn 'roarin fou' through which I walked ankle-deep. Fifteen minutes later I walked through another burn then another and another - four burns in all. My route home lay across the Dunnet Sands. The tide was ebbing, I kept close by the waves. For about three quarters of an hour I walked ankle deep in salt-water. After leaving the shore I had six miles to walk. I reached home at eight that evening with my plants, having walked eighteen miles in four hours and forty minutes".

I well remember climbing a Welsh mountain with nephew Steve (BPS Book Sales) and Karen a few years ago in search of *Woodsia ilvensis*, which we did not find and I still haven't seen in the wild, but on the way down we found *Trichomanes speciosum* purely by accident, which must be the pinnacle of my years of ferning. That was a fitting climax, for it was after that climb I decided mountains were no longer on my agenda, and come to that I'm not sure I shouldn't move house, as our present home is about three hundred feet above sea level.

We owe so much to men like Robert Dick, and I bless their memory and their ability through the accounts of their lives to continue to inspire.

FERNS IN GRAVE SITUATIONS

Heather McHaffie

RBGE, 20A Inverleith Row, Edinburgh EH3 5LR

Tempus fugit – Time flies

There is a remarkable amount of interest to be found in most Scottish graveyards. The oldest 17-18th century gravestones with skull and crossbones have some light relief with winged egg-timers, but perhaps the most realistic carvings are found in Victorian extravaganza. It is hardly surprising that ferns appear on the memorials to people who lived through the fern craze. There is a wide variation in the detail shown by carvers of gravestones. To some extent this must be governed by the hardness and grain of the selected stone. This is usually either marble or sandstone, although some thrifty spouses had the memorial carved in stone and then painted white, as is well illustrated on a stone at Bankfoot in Perthshire.

Here one can see the widely repeated theme of a pair of fronds with crossed stipes of a taxonomically obscure once-pinnate species with six-sided pinnae.

The neatness and symmetry of ferns lend themselves to formal designs. A very precise gravestone at Blairgowrie in Perthshire was erected in memory of a schoolmaster.

It has the classic broken column set on a four-sided pedestal. There are pairs of fronds at the top of each flat side, and in a narrow strip on the angles of each corner is one entire frond and two once-pinnate fronds, mixed with some indistinct flowers. Entire fronds usually suggest hart's tongue *Asplenium scolopendrium* and this is sometimes shown quite unmistakably.

In the large Dean cemetery in Edinburgh a wall-mounted memorial to Lady Moncreiff has an archway in relief overgrown with roses and passion-flowers, with a clump of hart's tongue at the base, balanced by a foxglove and a few leaves of something like *Geranium sylvaticum* (*below*). There are several sad little memorials in the same cemetery to young children. Each has a rustic cross above a base with hart's tongue, a once-pinnate fern and a single rosebud. In this case the once-pinnate fern is difficult to determine, but it occurs again on another more nautical style quite widely distributed.

There are variations on this maritime theme, but the most frequent components are a rugged cross, with or without an anchor, and a rope artistically twining around. In this setting the fern might be *Asplenium marinum*, although any flowers that are included are difficult to place.

Flowers have already been mentioned and often occur in a symmetrical arrangement flanked by ferns. Roses, lilies, thistles, poppies, ivy, vines and olive branches are frequent, with occasional convolvulus and lily of the valley. A distinction can be made between once-pinnate fronds with the pinnae stalked like an *Asplenium* ... ...

... ... or attached, like a *Polypodium*.

Both types are probably equally frequent and might depend on the style adopted by an individual mason. Doubtless the style will have been copied and stylised so that any resemblance initially intended becomes less clear through time.

Not so much a gravestone, but a memorial monument to the 6th Duke of Atholl is located in the middle of Dunkeld in Perthshire.

This elaborate drinking fountain is surmounted by four granite columns topped by a pinnacled roof. The whole

CHURCHYARD FERNS

of the roof has carvings of various birds and beasts, some more identifiable than others. What is probably a female pheasant is comfortably seated on some foreshortened hart's tongue appreciatively sniffing (sucking nectar, eating?) a bluebell, *Hyacinthoides non-scripta*. This touching scene is backed by a reasonably convincing male fern. Twice-pinnate fronds are generally less common but do occur.

A design seen as far apart as Blairgowrie and York, has a shield in the centre, which might have the date, with one or more fern fronds drooping down on either side. The whole fits neatly in the top of a gothic arch-shaped stone.

Unusually, a three-times pinnate pair of crossed fronds was found in East Lothian at Direlton. The grave occupant died abroad, so the species might be exotic, but its shape suggests something like a buckler fern.

Pairs of fronds, either crossing or mirroring one another are very common. The clan symbol of the Robertsons is bracken. They wore it in their hats when going into battle so as not to mistake one another for the enemy, who would usually be wearing a species of flowering plant. Given the average person's inability to distinguish between bracken and "fern" this could be reflected in the carvings on some gravestones where there might be a family connection to Robertsons. A common theme is an undulating ribbon enclosing two or more fronds which might be bracken pinnae.

Bracken is also realistically featured in the cast iron railings used to enclose family plots, seen in several places in and around Edinburgh. There are many examples around the edges of a carved stone, or even up the gable of a roof, of ornate 'twiddly bits' that closely resemble croziers.

A rather eccentric church by Loch Awe in Argyll has stones on the facing of the tower arranged in a herring-bone fashion to form gigantic tapering fronds (*above, right*).

What is probably the earliest representation of a fern variety is found at Rosslyn Chapel in Midlothian. The 15th century chapel abounds in fantastically ornate carving, but one particular pillar has

Bracken: cast iron railings in Edinburgh.

unmistakable forked fronds of hart's tongue. As this not uncommon variety is found beneath the nearby castle walls, perhaps a distant mason derived his inspiration from a similar plant four hundred and fifty years ago. [*See p. 29 and* Earliest Fern Image *p. 44*]

Living ferns quite naturally colonise graveyards, thriving on old walls and in shaded corners. The usual Aspleniums are common enough, with the occasional *Asplenium ceterach*, but sometimes the ferns are so unusual they must have been specially planted. *Osmunda regalis* grows around a gamekeeper's gravestone at Blairgowrie (*above*) and there are two clumps in the Dean cemetery in Edinburgh. One is modest in size, but the other is very substantial, which suggests that it has been there for maybe a century or more.

The cemetery can be a pleasant place for peaceful recreation and it is unusual to visit an old burial ground without finding at least one interesting work of art to occupy and please the pteridologist.

BOOK REVIEWS

NOS FOUGÈRES
UNSERE FARNE

Gregor Kozlowski

2002. Musée d'histoire naturelle, Fribourg/Naturhistorishes Museum, Freiburg, Switzerland. No ISBN. Hardback, 160 pp., b&w and colour illustrations. Price Swiss francs 26.00, order from Musée d'histoire naturelle/Fribourg/Naturhistorisches Museum Freiburg, Chemin du Musée 6, 1700 Fribourg, Switzerland or by email via: www.fr.ch/mhn/formulaires/fougere.htm

This is a very useful bilingual book which will introduce you to the ferns of the canton of Fribourg in Switzerland through a combination of excellent line drawings and colour photographs. You could also use it as a novel method of improving your French and German language skills as most of the ferns covered are known to the fringe Europeans in the UK.

The book begins with the life cycle, covers habitats and gives Red Data book data and useful general information before the body of the book. An illustrated key to species is followed by a splendid photograph of each fern accompanied by notes on habitat and ecology, distribution in the canton of Fribourg together with clear maps and threats to existence.

It will, of course, have wider usefulness beyond the borders of Fribourg. This is an interesting format which other authors and publishers would do well to note.

Josephine M. Camus

PTERIDOPHYTES OF NEPAL

Naresh Thapa

2002. Bull. Dept. Plant Resources No. 19. Paperback, 175pp. No ISSN or ISBN. Price Nepal rupee 260 (approx. £2.14), order from National Herbarium and Plant Laboratories, GPO Box 3708, Kathmandu, Nepal (E-mail: banaspati@nat_herb.wlink.com.np)

This book is a very useful addition to the pteridophyte floras of the world. Nepal is well known for its interesting ferns and fern allies, being a region where three major phytogeographical components meet: European, Sino-Himalayan and SE Asian.

The author (with such considerable input from Christopher R. Fraser-Jenkins that he should have been credited as co-author) has produced an annotated checklist giving synonymy, misapplied names, distribution information and sometimes-helpful data for distinguishing one species from similar ones. An interesting historical account of fern collecting and comprehensive reference list are included.

One new species and one new hybrid (*Polystichum annapurnicola* Fras.-Jenk., *Cheilanthes* x *fraser-jenkinsii* N.Thapa) are described and three new combinations are made (*Crepidomanes saxifragoides* (C.Presl) N.Thapa, *C. striatum* (D.Don) N.Thapa, *Thelypteris mollissima* (Kunze) N.Thapa. Unfortunately, the author has also pre-empted publication of the following names, making them *nomina nuda* until Fraser-Jenkins publishes his work on athyrioid ferns:

Athyrium x *drepanopteroides* Fras.-Jenk.
A. x *gurungae* Fras.-Jenk.
A. x *kathmanduensis* Fras.-Jenk.
A. x *lobulosoimpolitum* Fras.-Jenk.
A. x *nepalense* Fras.-Jenk.
Deparia japonica subsp. *indica* Fras.-Jenk.
Diplazium "cornopteroides" Fras.-Jenk.
Diplazium forestii (Ching in Z.R.Wang) Fras.-Jenk.
D. medogense (Ching & S.K.Wu) Fras.-Jenk.
D. x *tertium-maximale* Fras.-Jenk.
D. yaoshanicola (Ching) Fras.-Jenk.

Only three genera of Thelyperidaceae are recognised. CRF-J (pers. com.) did not check the whole book. Some spelling and typographic errors do not diminish the usefulness of this publication to pteridologists, foresters, conservationists etc.

This work is obviously a necessary addition to the bookshelf of any professional pteridologist and could also be of use to any enthusiast who knows the fern families and genera (as is usual with a checklist, there are no keys or illustrations). It is not obvious why the families are presented in the order given, but the index to species makes it easy to use. A pity that abbreviations used for the authors of the scientific names did not follow Pichi Sermolli (Authors of scientific names in pteridophyta, 1996, Royal Botanic Gardens, Kew).

I have to include a homily here. When you visit any country as a tourist you are breaking the law and putting the work of researchers in jeopardy if you collect ferns either as herbarium specimens or as spores or plants for cultivation. So how to use this book? Make observations (notes, drawings) using a hand lens and take photographs, both of the plant's habit and close-ups of details; read the book carefully to narrow down the number of likely species; visit one of the larger herbaria (e.g. in the UK The Natural History Museum, Royal Botanic Gardens, Kew, or the Royal Botanic Garden, Edinburgh) on your return.

Josephine M. Camus

From Madge Stokes

MODERN FERN USES Adrian Dyer's article *The Lidderdale Fern Hunt* reminded me that a few years ago I met two women gathering *Dryopteris* fronds in Cornwall for use as part of the floral decorations at a wedding. Not, however, such a picturesque scene as that featured in *Pteridologist* 4(1). I wonder if anyone is keeping track of modern uses of ferns?

ULTIMATE ACCOLADE! The BBC radio soap of rural life, The Archers, which has been a national institution in the UK since 1951 brought tree ferns to its listeners' ears on 6 November 2002 in an episode where Kenton Archer inspects premises for his proposed cyber cafe with Kathy Perks and describes the decor which will feature these magnificent plants.

EARLIEST FERN IMAGE I have long wondered what the earliest fern image is. Can readers help?
I had only been thinking of painted images on paper or canvas (or wood), but Peter Hovenkamp at the Rijksherbarium, Leiden, remembered the article on St Martin's Fern in *Fiddlehead Forum* 16(6), 1989, showing *Botrychium* in a stained glass window dated 1220 at Canterbury Cathedral, Kent, UK. Stone or wood carvings are other possibilities. So I would really like to know of the earliest in each medium.

Contributions to *Pteridologist* please.

Tree-Fern Newsletter No. 9

Edited by Alastair C. Wardlaw
Convenor of BPS Tree-Fern Special Interest Group

Continuing the arrangements started last year, and by courtesy of the Editor of *Pteridologist*, this Newsletter is intended for the BPS as a whole, and not only for members of the Tree-Fern Special Interest Group.

Likewise the all-day *Mini-Symposium on Tree Ferns* to be held at Kew on Saturday 8th November, 2003, is open to all members of the Society (and to non-members who may be interested).

I hope this year to conduct the first *Survey of the Species of Tree Fern in Cultivation* by members of the Special Interest Group. So please be gathering your thoughts and data as I hope all Group members will participate. I expect to be sending out questionnaires during the summer and shall be asking for information on failures as well as successes.

As always, pictures, notes and longer articles on tree ferns should be sent to me for the next TF Newsletter. I am generally short of copy! ACW

***Dicksonia fibrosa*, showing its characteristic skirt of withered fronds, in a roadside park in Ohakune, North Island of New Zealand, with World War 2 light tank.**

Tree-Fern Mini-Symposium!

A BPS all-day (10.30 - 18.00) Mini-Symposium devoted to *Tree Ferns* will be held in the Herbarium of The Royal Botanic Garden, Kew, on Saturday 8th November, 2003.

***Dicksonia fibrosa* under glass at Kew**

We believe this will be the first ***Symposium on Tree Ferns*** to be held in the UK, certainly the first by the BPS.

In addition to the programme of lectures, and discussion period, there will be displays of tree fern publications and paintings. Herbarium specimens can be consulted by prior arrangement.

Outline Programme

- Tree Ferns of Temperate Lands (Martin Rickard)
- Why Be a Tree Fern? (Chris Page)
- A Gardener's View of Tree Fern Taxonomy (Alastair Wardlaw)
- BPS Members' slides of tree ferns
- Ecology of Tree Ferns in New Guinea (Bob Johns)
- Conservation of Tree Ferns (Discussion) (Clive Jermy)
- Fossil Tree Ferns (Barry Thomas)
- Tree Ferns Growing Outdoors in Britain (Alastair Wardlaw)
- General Discussion

To get a copy of the programme and other essential particulars (location map, catering, etc) please contact.....

Graham Ackers
Deersbrook, Horsham Rd,
Walliswood, Surrey RH5 5RL, UK
Email: GrahamAckers@compuserve.com
Tel/Fax: 01306 627330

.....by the end of August (unless you have already registered your interest via the *BPS Meetings Reply Form 2003*).

Major Changes in Rickard's Hardy Ferns Ltd

End of an Era

Martin Rickard recently gave up ownership of the widely-known fern nursery that he set up at Kyre Park and which had become a place of pilgrimage for all lovers of rare ferns, especially tree ferns. For many years the acknowledged authority on fern horticulture, Martin has received gold medals running into double figures at Chelsea, Hampton Court, Malvern and other major flower shows. This year he was awarded the Veitch Memorial Medal of the Royal Horticultural Society.

His highly successful *The Plantfinder's Guide to Garden Ferns* (David & Charles, 2000) has made Martin into a much-requested lecturer wherever fern enthusiasts meet. We look forward to seeing his further books that are currently in press and in preparation, and to which he is now devoting his energies.

New members of the BPS should know that Martin is a past President (1997-2001) of the Society and was the first Editor of *Pteridologist* (1984-1993). He set up the Tree Fern Special Interest Group in 1994, and produced the early issues of this *Newsletter*. I am one of many who acknowledge to him a great debt for bringing tree ferns into prominence and availability through his pioneering activities at RHF Ltd.

Rebirth

In late 2002 Martin transferred the ownership of *Rickard's Hardy Ferns Ltd* to Dick Hayward, a long-time member of the BPS and, more recently of the Tree-Fern Special Interest Group.

Tree-fern barn and main propagation facilities at the new Rickard's Hardy Ferns Ltd in Gwynedd

The nursery's rebirth has taken place in North Wales, near to Caernarvon. Martin, as would be expected, has retained a strong interest in continuity. He has helped Dick to make the transfer to the new site and is likely to be involved in mounting displays of ferns at the major flower shows. An auspicious start has been the award of a Gold Medal to the *new* RHF at the 2003 Chelsea Flower Show.

A 2003 Catalogue for Rickard's Hardy Ferns Ltd, in its new incarnation, has been prepared, and fresh supplies of tree ferns and other ferns are available now. Mail Order is in place, as before.

Henceforth enquiries for RHF should be addressed to Dick Hayward at:

Rickard's Hardy Ferns Ltd
Carreg-y-Fedwen, Sling, Tregarth,
Gwynedd, WALES LL57 4RP
Tel/Fax: 01248-602944
Tel (Evenings): 01286-677641
Website (in preparation)

Dick Hayward in the Tree-Fern Barn

How to get there

The nursery is in a beautiful setting on the lower edge of the forested slopes of Moel-y-Ci (GR 592667). The best approach is from the A4244, the start of which is at the service station near the junction of the A55 and the A5. If travelling in a SW direction on the A4244, turn left 100 yards beyond a sign saying 'Pentir – Drive carefully!' After another 100 yards there is a T-junction. Turn left again. The narrow lane (Lon rallt) now swings sharply right. Follow this to its end at a gate and a Highway Authority sign (blue). The nursery stands on the right, where the large barn is a prominent feature on the landscape. Visitors should telephone before travelling, to check that staff will be available to meet them.

Acknowledgement: I am grateful to Martin Rickard and Dick Hayward for help with these notes and also to Dick for permission to use his photos.

ACW

The Galápagos Tree Fern - *Cyathea weatherbyana*

Alan Ogden, 9 The Drive, Hopwood, Worcestershire B48 7AH, UK

The Galápagos Archipelago is not noted for ferns, and the available guide books tend to concentrate on the wonderful attractions of the fauna. The flora in the main areas where visitors go is unspectacular, so on my first trip to these islands I was surprised to find an interesting variety of ferns in the Giant Tortoise Reserve on Santa Cruz Island.

The following year I came across a new book *Flowering Plants of the Galápagos* (Mullen, 1999), which, despite its title, contains descriptions of several ferns that grow in the wetter uplands of the more mountainous islands. I was thrilled to see a picture of a Galápagos tree fern and resolved to find it if I went there again.

Although the rainfall in this area is normally very sparse, clouds which are created by the cold water of the Humboldt current meeting the tropical air at the Equator, often surround the mountain tops, thus providing the moisture for more luxuriant plant growth. Tourists are not allowed to wander about without a guide but fortunately when I went to the islands again last year we had the same guide as before, so I was able to e-mail him in Quito to ask if we could visit the tree fern area.

While the rest of our party went to the Charles Darwin Research Centre, Santiago Bejarano and I hired a taxi to take us to the highlands of Santa Cruz. We walked through the Scalesia forest, shrouded in mist, to a huge crater which was one of a pair of volcanic vents called "Los Gemelos", The Twins.

There was a profusion of ferns and mosses in this area and, growing in the wall of the crater, was the tree fern - small, but definitely a tree fern. It was impossible to climb down but I took some pictures.

When I came home, Alison Paul at the Natural History Museum in London was able to find some references for me (Svenson, 1938; Morton, 1957). The tree fern was named for Charles Weatherby who, as Jimmy Dyce did for us, kept the American Fern Society going through some difficult times (Svenson, 1950). A more detailed account of this visit to Galápagos was published elsewhere (Ogden, 2003).

One of the *Los Gemelos* (The Twins) craters on Santa Cruz

The Galápagos tree fern, *Cyathea weatherbyana*, growing inaccessibly on the crater wall

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Cyathea smithii in Linn Botanic Gardens, Scotland

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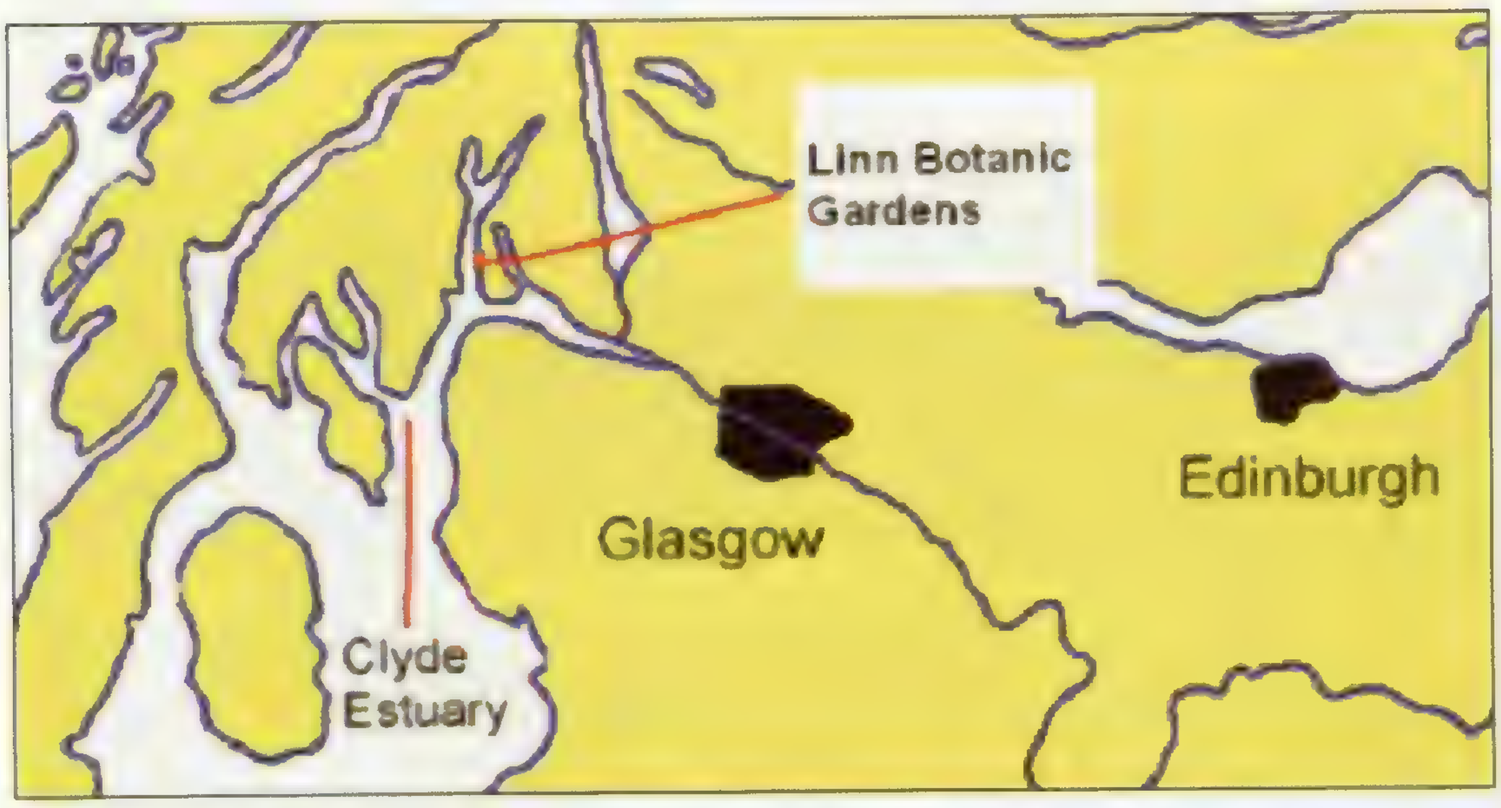


Linn Botanic Gardens on the east shore of Loch Long

The New Zealand tree fern *Cyathea smithii* has been featured in previous TF Newsletters, most recently last year, when Mattan Schout reported its successful cultivation outside (but winter-wrapped!) in The Netherlands.

A fair degree of winter hardiness is suggested by its occurrence, not only on the main islands of New Zealand, but also on the remote Auckland Islands, which are sub-antarctic and uninhabited, at latitude 50°S.

Thus *C. smithii* grows closer to a Polar region than any other species of tree fern.

Here we record some observations on a tall (180 cm trunk) specimen of *C. smithii* sourced from New Zealand and obtained from Rickard's Hardy Ferns Ltd in the Spring of 2001.

Location: Linn Botanic Gardens (open daily to the public from March to October, 11.00-17.00) are situated on the Rosneath Peninsula, north-west of Glasgow.

The site is within 100 metres of the shore of Loch Long, one of the sheltered sea-lochs in the Clyde Estuary, where the climate is moderated by the North Atlantic Drift. The Gardens have many Southern Hemisphere vascular plants, including numerous ferns; hence the interest in trialling *C. smithii.*

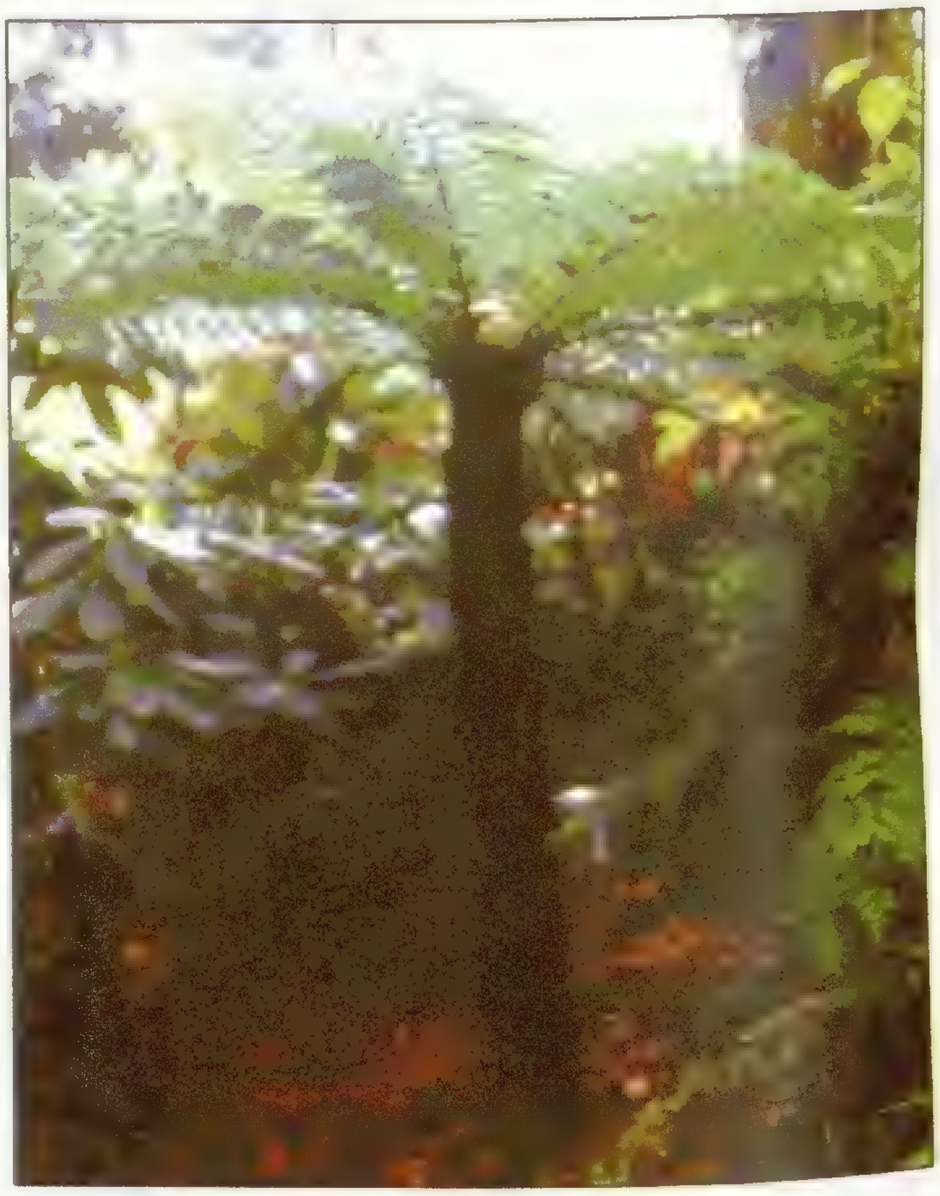
The higher parts are on a wooded south-west facing slope and have a *ca.* 10-metre deep, rocky gully with stream.

Planting and Observations

The *C. smithii* was planted in an approximately 50 cm deep layer of soil/leaf mould mixture on a 1.5 m wide ledge in the gully, about 2 m above the stream. Oak trees are overhead and the crown of the fern is well below the top edge of the bank. This location provides high humidity, dappled shade and wind protection. In dry spells the plant is watered down the crown and trunk with cans of water from above.

Nearby in the garden are *Dicksonia antarctica, D. fibrosa, D. squarrosa, Cyathea australis* and *C. cunninghamii* (to mention just the tree ferns).

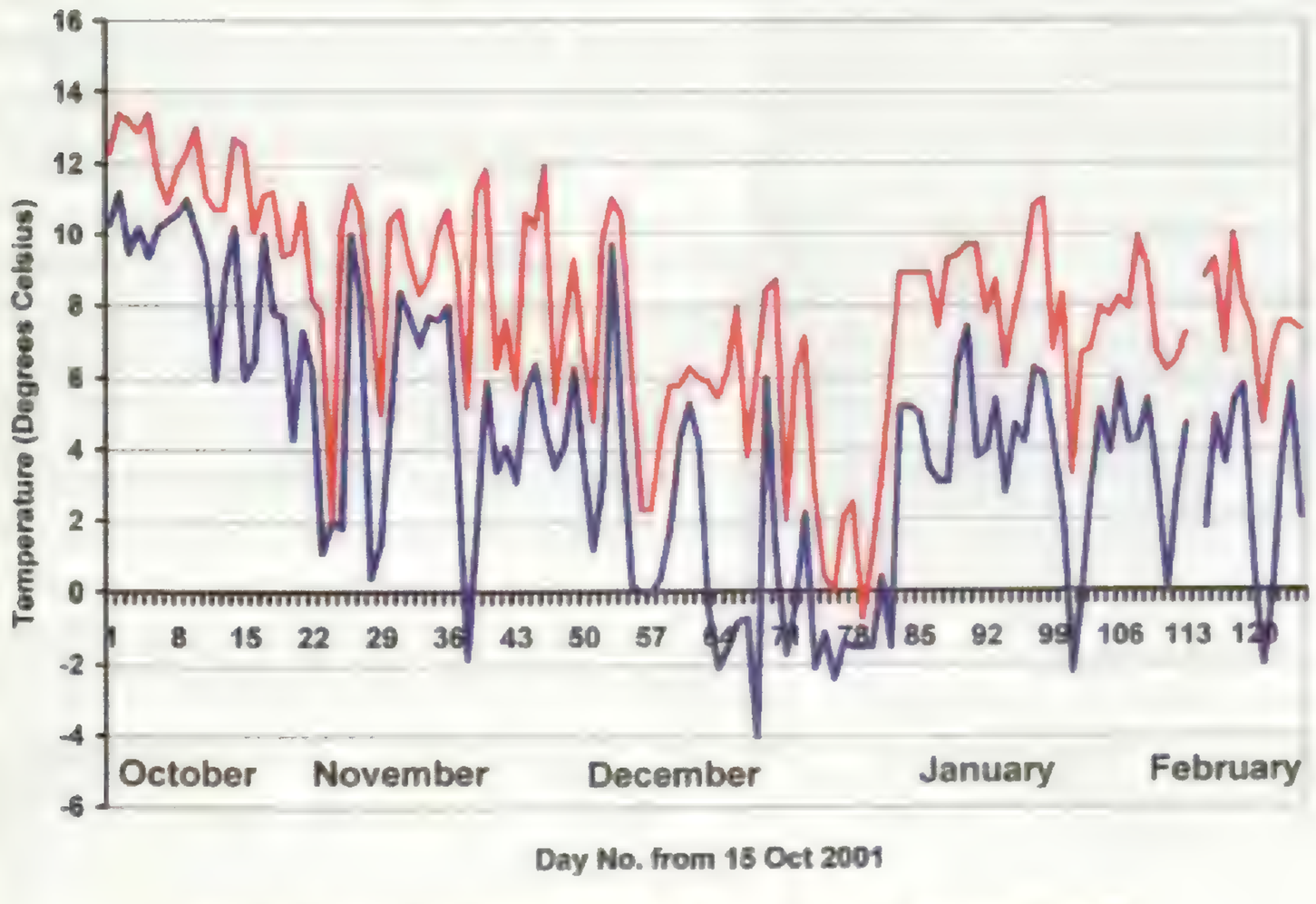
Summer Growth: The *C. smithii* grew well during its first summer, and put out numerous large fronds. In mid-October the probe of an electric thermometer (ATP Instrumentation Ltd), on a 2-metre cable, was fastened deep into the crown (apical cleft). The case of the thermometer (visible in the photos) was mounted on a cane near to the trunk and about 60 cm above ground level. It contained a second thermometer to measure the air temperature, and was protected from rain with a plastic cover. Daily readings of minimum and maximum temperature were taken for 4 months from 15 October 2001 until 18 February, 2002. The condition of the fronds was also noted.



***C. smithii* in October 2001, at the end of its first growing season**

No wrapping or insulation was provided to the plant, apart from the leaves that fell on to the crown from an overhead oak tree to a depth of about 15 cm, and which were supplemented occasionally by a few further handfuls.

Winter Temperatures: The graphs (*below*) present the daily minimum (blue line) and maximum (red line) temperatures within the crown of the *C. smithii*. The first reading below freezing point was on 23 November (day 38), when -1.7 °C was recorded. There was then a gap until 18 December, when there was an almost 3 week cold spell into early January. Within this period were 16 days when the crown registered sub-zero minimum temperatures. Thereafter there were two further episodes below zero, both brief, on 25 January (-2.2 °C) and 14 February (-2 °C).



Winter minimum (blue) and maximum (red) temperatures within the crown of *C. smithii*

The lowest temperature recorded within the crown was -4.0 °C on 23 December. But the corresponding air temperature minimum was only -1.7 °C, which at first sight is difficult to explain. How could the crown apparently be colder than the surrounding air? Assuming there was no fault in the thermometer, the answer may be because radiative heat loss on a clear night could be greater from the crown of the tree fern (under bare oak trees) than from the thermometer case 1 metre underneath the shelter of the fronds and with a plastic cover.

The graphs also show that the ups and downs of the daily minimum temperatures were closely mirrored by the corresponding maximum values. On average, over the 4 months of observations, there was a 4.0 °C difference between the daily minimum and maximum readings.

Air temperatures, although recorded, are not presented here because they were so close to the crown temperatures, generally within ±1 to 2 °C. Thus the air and crown graphs mostly superimpose on each other.

Frond damage on 6 January, 2002

Frond Observations: The fronds stayed green until the period of sub-zero minimum temperatures in late-December into early January. On 29 December, several dark patches were noticed on the sides of some pinnules, indicating frost damage. By 6 January, there were considerable patches of blackening (as illustrated). On 25 January the fronds were much weighed down by about 8 cm snow, which soon melted. By late April, new croziers were uncurling, and the plant eventually developed 14 large fronds, some of which were fertile. Spores were collected at the end of the second growing season and supplied to the BPS Spore Exchange for the *2003 Spore List*.

Discussion and Conclusions

Cyathea smithii is common in its native New Zealand, where it grows in the forests as a subcanopy species and seems to prefer (or tolerate!) cool and wet conditions. It is the dominant tree fern at high altitudes and is the only one of the 10 NZ species of tree fern that occurs in the Auckland Islands. It is noticeably uncommon in artificial plantings of tree ferns in NZ parks and gardens, suggesting a need for sheltered conditions.

Climate information for the Auckland Islands was reported in TF Newsletter No.7 (2001). Briefly, there is about 2,000 mm of annual rainfall, from about 300 rain days in the year. The mean monthly minimum temperature in the coldest winter month is about -3 °C and the mean monthly maximum temperature in the warmest summer month around 19 °C. Compared with Glasgow (at Latitude 56 °N), the Aucklands, at Latitude 50 °S, have about twice the rainfall, similar winter minimum temperatures but substantially lower summer maxima. The 106 intending colonists who went out to the Aucklands in 1849 found that the cold, wet and cloud-dominated summer prevented cultivation even of potatoes or turnips. They soon gave up the attempt to settle on these inhospitable islands and left for elsewhere. But *C. smithii* apparently finds the conditions suitable and is still there 150 years later.

Mattan Schout reported (*Pteridologist,* 2002) a winter minimum (air) temperature in his Dutch garden of -7 °C, which his *C. smithii* survived – but the plant was well wrapped up, both trunk and fronds, as he described. Also the freezing spell was short-lived.

One of us (ACW) in Glasgow has previously lost two trunked specimens of *C. smithii*, despite winter wrapping, when the garden temperature fell to -5 °C or lower. This was attributed to the wrapping being inadequate, since insulation can only delay the freezing of the crown, but not prevent it if the cold spell lasts long enough.

During this past winter in ACW's garden, two new specimens of *C. smithii*, with 1.2 and 1.6 m trunks, have survived well, and in early April started to put out croziers. Both specimens were trunk- and crown-insulated with aluminium foil, 4 cm bubblewrap and an overhead transparent roof; also the crowns were provided with 'temperature-buffers' (see note below) which prevented sub-zero temperatures within the crown.

To conclude, *C. smithii* can be grown outside in the special habitat in Linn Botanic Gardens, where many tender plants flourish. However except in similarly sheltered habitats, this species seems likely to need winter insulation. Even at Linn, its survival unwrapped may be risky, for the specimen here has yet to experience a severe winter. However, from the temperatures reported, it would seem that the crown of a mature specimen can survive temperatures down to -2 °C, maybe even to -4 °C, at least for short periods, without loss of viability, although the fronds are damaged.

Summer growth also requires proper consideration of habitat, especially adequate humidity, and protection from drying winds.

Experience so far suggests that *C. smithii* can not yet be considered a serious competitor of *D. antarctica* for gardeners who want a tree fern primarily for 'architectural' or aesthetic reasons. However, it may provide challenges and satisfactions for tree-fern specialists. We hope that the preliminary experiences recorded here will help those who are thinking of growing this interesting species, and may forestall unnecessary disappointments.

~ Note from Glasgow ~
Temperature Buffers for Tree-Fern Crowns

Last winter, after wrapping the trunks of my 7 (outside-planted) tree ferns with aluminium foil and bubblewrap, and providing a transparent roof over most of the frond area, a good wad of horticultural fleece was stuffed into the crown and around the stipe bases.

Then a 1 litre plastic soft-drinks bottle, three-quarters filled with water - the temperature buffer - was laid horizontally across the crown and covered with aluminium foil, which was tucked among the already fleeced stipe bases.

On frosty nights there were thus four protective devices to prevent freezing of the crown: the fleece, the temperature-buffering effect of the water, the aluminium foil (to minimize radiative heat loss to the sky) and the transparent roof.

Only after all the water had been converted to ice would the crown be at risk of cooling below 0 °C, something to be avoided as much as possible. That was the theory.

In practice, on -5 °C nights, typically about one-half of the water in the bottle had frozen by next morning, but the thermometer in the tree fern crown generally registered a few degrees *above* zero. The ice was removed and the bottle recharged with cold water.

Those who remember their school physics may recall that one gram of water loses one calorie in cooling from 1 °C to 0 °C, but it then has to lose 80 calories (the latent heat of fusion) to be converted to ice at 0 °C, the principle of the temperature buffer.

ACW

FOCUS ON FERNERIES

James Merryweather

Home Farm, Attadale,
Strathcarron, Wester Ross IV54 8YX

Wallace Fyfe

ASCOG HALL FERNERY

When they bought Ascog Hall in 1986, Wallace and Kath Fyfe also unwittingly became owners of a Victorian Fernery. In their minds they had invested in a beautiful, if decrepit, turreted nineteenth-century house with an overgrown but promising garden that might one day give them pleasure - once the house had been made habitable. Of course the Fyfes explored the garden, but they paid little attention to a well-hidden structure which seemed to be the roof of a collapsed glasshouse.

They spent many years on the first phase, restoration of the house. Wallace even turned himself into a temporary small building firm which eventually found itself in demand at other properties on the island. Then, after several years occupancy, but before the house was finished - there are still some corners awaiting attention - the Fyfes had a look at the ruin in the garden. They found a doorway, and were able to creep in and crawl around. The floor was a sea of mud and what space remained between roof and floor was choked with weeds, but among the brambles they could see the trunks of dead tree ferns, some upright, others crushed beneath fallen ironwork and broken glass. This was the unforeseen beginning of the Fyfes as pteridologists, willing or not. From that point on they were obliged to learn an immense amount about the biology and culture of foreign and native ferns.

The original roof was beyond repair so it was replaced thanks to a grant from Historic Scotland. The interior was cleared so that advisers from the Royal Botanic Garden, Edinburgh could restock it according to a species list given in a description of the fernery published in *The Gardener's Chronicle* in 1879.

GROWING CONDITIONS

The interior is a rounded L-shaped depression dug out of the ground about 10 ft deep and lined with large weathered blocks of old red sandstone and conglomerate of local origin, collected from the sea shore a matter of yards distant. Between the rocks are plenty of gaps, crevices, pockets and shelves to take plants. A small burn (stream) from the hillside behind the fernery enters from

PHOTO: WALLACE FYFE

Left: *Todea barbara* & *Trichomanes venosum*; centre: stream forming small waterfall and recess with *T. speciosum*; right: *Cyathea spinulosa*.

above at the north end and tumbles as an attractive little waterfall over a rock shelf into the deep pool. It flows under an ornamental bridge and divides over two sills to make a shallow pool about eight inches deep in the centre of which are large rocky islands which occupy most of its area. The water then flows out at the south end controlled by a simple overflow (with secondary overflow in case the first gets blocked) and through the garden to the sea where it was heading before it was diverted to surround the fern beds.

As well as the sandstone, there are a few strategically positioned base-rich rocks, originally of volcanic origin and mostly basalt. However, these are fused together forming irregular lumps and they were obviously *robbed* (a conventional archaeologists' term for reuse of masonery) from the top of the main crag at Dunagoil a few miles away where there are the remains of a Bronze Age "vitrified fort". Several of these have been identified in Scotland and it is thought that such forts were constructed of stone blocks bound together with timbers. If a fire caught, the result could be catastrophic, and the heat produced sufficient to melt and fuse the stones together in the state in which they are now found, some still at Dunagoil but a few now, as in 1879, at Ascog.

The interior temperature rarely exceeds 28°C in summer and when the outdoor temperature is at its lowest, around -5°C, inside it is still never less than +1°C. Therefore, the fernery has no supplementary heating. The glass roof lets in plenty of light, a bit too much the Fyfes are beginning to think, for fronds can sometimes become quite yellow or even scorched. Originally there was an ancient lime tree outside, which afforded a dappled shade, but it had to be felled during the restoration of the garden. Some sort of shading is being considered, but what is in keeping with this elegant structure? Whitewash is unsightly and difficult to apply to so broad a glass roof, and green plastic netting is being vigorously resisted.

THE PLANTS

Ferns are planted everywhere - well it *is* a fernery - but there are few flowering plants. Of the latter, some such as the monkey puzzle relative *Araucaria rulei* and a papyrus *Cyperus involucratus* were deliberately planted, but others are 'volunteers', nipped out as they arrive. Sow thistle, herb robert, lady fern and numerous little cress plants are unwelcome weeds. So is 'baby's tears' (*Solierolia solierolii*) which creeps everywhere, but is tolerated, for it can be very pretty and is a remnant of the Victorian flora. Only a small cushion had survived, but as soon as

Sculpture by Columba James in alcove, attractively embedded in 'baby's tears'.

it got the chance it spread everywhere. It certainly provides visual enhancement in some places, but where it encroaches on valuable ferns or threatens to replace any of the numerous mosses which have made their home here, it is scraped out and composted.

TREE FERNS

Most, if not all, of the tree ferns brought in by RBGE survived the ordeal of transplantation and have grown immensely. As you enter, you are confronted with a short but robust *Dicksonia antarctica* with a massive canopy and its trunk covered by a dense cinnamon-coloured root mantle. More roots emerge at its base to form large tufts in the water of the pool below, and require frequent pruning. Next to it, and by the path, is the inexplicably popular *Asplenium bulbiferum* which tends to occupy the interest of some visitors more than the exotic Ascog specialities. Round to the right is a magnificent *Cyathea medullaris* with elegant black stipes and, as I write, a new frond unfurling in the way in which only another tree fern could truly excel. *C. spinulosa*, at the far end of the fernery, beats *C. medullaris* in this respect, each unrolling crozier containing echoing, smaller croziers of its pinnae.

Tree ferns have been carefully situated throughout the fernery and there are numerous delightful angles and contexts from which to view them. The full list is: *Dicksonia antarctica* (plus several in the garden) *D. fibrosa*, *D. squarrosa*, *Cyathea medullaris*, *C. cooperi*, *C. milnei*, *C. australis*, *C. dregei* (2), *C. lunulata*, *C. robusta*, *Cibotium scheidei* and, if we count them as tree ferns, a couple of *Blechnum* species including *B. gibbum*. Since there is no natural leaf litter nutrient input, they all receive a monthly foliar dose of dilute liquid fertiliser and, occasionally, a small amount of very well rotted horse muck around the trunk. At present there is no reason to change this regime, for they are all doing very well on it, indeed the largest fronds are threatening to reach and squash up against the roof, and what then?

OTHER FERNS

Some of the original Victorian tree fern stumps have been retained as home to epiphytic ferns. One has been successfully colonised by *Microsorum scandens* accompanied by unintended *Dryopteris dilatata* and *Selaginella kraussiana* (the weed among numerous *Selaginella* species here) which will remain welcome unless they threaten to overwhelm the specimen fern. On another, *Phlebodium aureum* 'Glaucum' does well.

When I first visited the fernery in July 1997 the plants were not over large, but they did look as though they had always been there. I was astonished when told that the ferns had been planted only months previously in the spring, well, all except Ascog's now famous *Todea barbara* which, of the original collection, was the only obvious survivor after decades of neglect. I have returned more or less annually to share the Fyfe teapot and watch the collection mature and develop, in particular the *Todea* which at first looked OK with its crown of long scrawny fronds, but now is luxuriant. Whilst many of the ferns were planted in the ideal position and, with the intelligent care the Fyfes lavish on them, have thrived, others have of course failed to make it, notably, and regrettably, *Dryopteris tokyoensis*. The fernery provides a range of growing conditions: soil dry, damp or wet; atmosphere dry, humid or spray; lighting dark, shady or sunny; temperatures from warm to cool. So, if deterioration becomes apparent, a considered move often restores ailing ferns to good health.

ASCOG HALL FERNERY

Several *Adiantum* species thrive here. One gorgeous maidenhair, with exquisitely dissected pinnae (labelled "Adiantum capillus-veneris"), grows dense plumes of fronds two feet long in most situations. I expect that among the very many ferns here, the label has been accidentally moved to the wrong plant and this variety (of which species?) needs to be properly identified. Visiting pteridologists who are able, should not be shy of helping to correct wrong labels. There are plants that seem to be proper *A. capillus-veneris* all over the walls plus several plants of *A. reniforme*. Only one plant of this fern is doing well, growing in a deep, quite dry crevice in full south-facing sun where, Kath suspects, it enjoys good air circulation. Others of the same species that are less well lit or have too damp a root run, are shrinking, browned off, moribund.

Asplenium aethiopicum has been the most difficult fern at Ascog. The Fyfes have several plants set in all sorts of circumstances and, although they survive, they do not thrive and they look tatty. This is an ideal candidate for their courage to experiment. Wallace suspects that this species requires a bit of lime, a commodity not found in old red sandstone. He will make up a new soil mixture and pack it into one of the hollow shelves where an unhappy *A. aethiopicum* will be given its last chance.

In contrast, *Woodwardia radicans* has to be kept under control and grows happily outside as well as in the fernery thanks to the almost frost-free climate of Western Scotland. Its bulbils are a rich source of fascination to the visitor and of potted plants on the "For Sale" table.

FILMY FERNS

The 1879 list didn't mention filmy ferns, and at first the Ascog collection was not provided with them, but there were numerous dark, humid spots which were vacant and looked ideal for *Trichomanes speciosum*. Recently two patches of Killarney fern from Glasgow Botanical Gardens were installed and it will be interesting to watch their progress (or - the Fyfes are realistic - decline). So far, they look happy enough. A large chunk of *T. s.* has been installed in a little shady "coombe" at foot level in the northeast wall by the path. The other is a plant which had no more than half a dozen fronds, but a new one has already sprung up through the moss about six inches from the others suggesting that it has become established. It sits on a shady eye-level shelf a foot behind the waterfall formed by the incoming burn. Here it is quite dark and constantly humid, but the water never splashes on it, apparently ideal. Neither situation is north-facing, but in a sunken house this may not matter.

Some local *Hymenophyllum tunbrigense*, which is reasonably common in parts of Bute, has shown signs of liking its station on the south wall, facing north. Other filmies include small *Leptopteris hymenophylloides* which currently resides, still in its pot, in a dark, humid recess in the north wall while Wallace assesses its performance. It seems to be doing well there, so it will be planted *in situ* soon. Another is a plant which superficially resembles *T. speciosum* labelled "Hymenophyllum demusum". Maybe it should read *Hymenophyllum demissum*. Before long, someone who has appropriate expertise might visit and provide welcome advice. I wonder if *Leptopteris superba* would thrive at Ascog? Is anyone able to donate a plant?

For a while it was presumed that the *Todea* was the only fern left from the original Victorian collection and the assertion in *The Gardener's Chronicle* that it was "a thousand years old or more" in 1879 has been quoted frequently to great effect in publicity whether or not it might be nineteenth-century exaggeration. There is quite a cubic metre of rhizome with a dense, multi-crown tuft of metre-long fronds on top, and it is certainly very ancient. However, nobody was expecting another, diminutive fern to have made it to the twentieth century as well.

A filmy fern had been noted growing on one face of the rhizome of the *Todea*. An expert once gave the diagnosis *Hymenophyllum tunbrigense*, quite why, I don't know because it doesn't look anything like it. During many visits I decided that it would be diplomatic not to question the identity of the little fern. After all, detail was not visible as it was beyond reach across the stream that runs through the fernery. A couple of summers ago I got permission to grab a piece to look at more closely. Close to, I certainly did not recognise it, and it was obviously not a British filmy. Given time for a bit of head scratching, I discovered deep in my mental card index, memory of a paper in the *Fern Gazette* about *Trichomanes venosum*. I sought it out and found that the author was Fred Rumsey at the Natural History Museum. He confirmed that it is *T. venosum*, a native of Australia, which is also the home of its present host *T. barbara*. So the little fern had piggybacked on its *Todea* all the way from the other side of the world and the relationship survived thanks to the gentleness of the Scottish climate through most of the twentieth century after the fernery went out of use and deteriorated.

Another fern, which possibly made it through to modern times, is a species of *Cyrtomium* which the Fyfes swear they did not plant. One of the two specimens looks as if it has been on its rock for a long time.

When I was visiting the fernery at Easter 2002, among the visitors there at the same time was retired Pipe Major Ian MacPhail with walking stick and grandson, also Ian MacPhail (who is also a bagpiper). He recalled how, as a boy in the 1920s, he had sneaked into the garden to play in the fernery among the tree ferns, dead even then but remembered with obvious pleasure. He was delighted to see the place in its restored condition.

VISIT ASCOG HALL FERNERY

Isle of Bute, Scotland, PA20 9EU
☎ 01700 504555
www.ascoghallfernery.co.uk

Ascog Hall Fernery has developed into one of the most important survivals of the Victorian fern craze and is more than simply *worth a visit*. It is a *must*. Take a car ferry to Rothesay from Wemyss (*Weems*) Bay or, when they come into service this summer, catch one of the luxurious new passenger ships from Glasgow. The ferries might be a tad pricey, but Bute has other attractions to make a stay worthwhile and B&B is cheap, from £17. For information about accommodation and the Isle of Bute visit www.isle-of-bute.com or contact Tourist Information ☎ 01700 502151).

..... AND INCIDENTALLY

Recently some colossal samples of *Todea barbara* have been brought from its seclusion in the Dardenong Ranges, near Port Philip [Australia]. The stump-like trunk of one, after the removal of its hundreds of fronds, weighed 2,900 lb. ; it required to be dragged out of its recess by a train of oxen. The monster fern is to be placed in the conservatory of Melbourne, where the mycologist, the Rev. Heinrich Tode, so long laboured for the Church and for science also, and where his mortal remains are buried.

The Florist and Pommologist
September 1884, Garden Gossip p. 143.

A correspondent (CT Druery?) added the following rider:

"*Todea speciosa* var. Cringerii. This variety is a parasite, forming sponge-like excrescences on the *big nobs* of old genealogical trees. It is found at high levels in most parts of the world, is of decumbent habit, never quite upright, and when well established in a warm place frequently adopts a crest." C.T.D.

[*This is not pteridology but elegant satire. Druery's target? Perhaps members of the common throng rising to join the aristocracy, or even a specific fellow pteridologist with aspirations? Maybe the answer is hidden in the BPS archive, awaiting discovery through research - ed.*]

THOSE TERRIBLE TWINS

Blechnum microphllyum and *B. penna-marina* *Blechnum chilense* and *B. magellanicum* and other Chilean *Blechnum* species

Sylvia Martinelli

Old Farm Cottage, Olmstead Green
Castle Camps, Cambridge CB1 6TW

Floras! Don't you hate them when you are perched on a wet rock in the rain, flora in hand, trying to distinguish one small blechnum from another; both grow in that kind of habitat and both are found in that part of the country. The flora leaves you in the lurch. By that I mean it writes insufficiently on the subject of one or both of the alternatives, or it relies on quantitative characters as distinguishing features and/or it fails to mention some nice clear qualitative characters. I remember looking at cat's ear calochortus in California and reading that: "species X has anthers ranging from 2-4 mm long, species Y has anthers 3-5 mm long", then finding all my *Calochortus elegans/C. tolmei* specimens had anthers 4 mm long. It was the same story for several other overlapping characters. Back in Chile in 2002 on the BPS trip, a similar theme emerged. There are 2 small creeping blechnums (*B. microphyllum* and *B. penna-marina*) and two large blechnums with woody trunks (*B. magellanicum* and *B. chilense*) on the mainland. 'Proper' tree-fern blechnums occur on the Robinson Crusoe Islands (Islas Juan Fernandez). I don't remember any discussion about the small ones with the BPS group whilst in Chile, although I spent some time trying to identify our pressed specimens in the evenings. However, the entire group was quite exercised over the problem of the two large blechnums because these are grown and sold in Britain under a variety of names (*Pteridologist*, 2002, 4(1) p. 5).

We wanted to return with a definitive description of each.

I have an equation which goes:

Dimorphic + pinnate + (not very rough edge) + (sori cover pinnae) = BLECHNUM

B. microphyllum - *B. penna-marina*

Dealing first with the tiny ferns: *B. microphyllum* (formerly *B. gayanum*) and *B. penna-marina*. Luer (*Helechos de Chile*) has little to say on the latter: just two lines of description and three lines of geography. He says rather more about *B. microphyllum*. *Flora de Chile* is more expansive but not much more helpful and *Flora Patagonica* is sometimes contradictory (compared with the others) and often muddling to me. So how does one tell the difference?

Every time I got down to my knees to look at a small blechnum, I had the same problem of identification. In retrospect I could have cheated and used the locality as an identification tool, especially in Parque Nacional Nahuelbuta. The park is on a coastal low altitude mountain range (less than 1,000 m) and *B. microphyllum* is described as alpine, or sub-alpine and cordilleran (Andean and over 1,000 m), hence the diminutive blechnum in Nahuelbuta had to be *B. penna-marina*. The distribution of *B. microphyllum* is from the province of Cordillera in the Andes (near Santiago) to the province of Llanquihue in Los Lagos. It is also found in Cerro La Campana in the coastal Valparaiso province and Andean Southern Argentina. In Chile, *B. penna-marina* is found from Malleco province (approximately 35° latitude) to Tierra del Fuego, and in both coastal and Andean mountains although it prefers humid places. It is said in the flora that when it grows in '*mallines*' in the south it spreads widely by vegetative propagation forming large mats. Its overall distribution is austral circumpolar.

After seeing what I thought were both species on this trip, I decided that the critical feature is the angle formed by the pinna with the rachis. In *B. penna-marina*, the pinnae are perpendicular to the rachis and the fertile ones at least are curved towards the tip, whereas in *B. microphyllum* they are not, but rather the pinnae are more or less oblique and incline towards the apex of the frond. This description certainly seemed to fit my specimens. Based only on the drawings and silhouettes of both in the various floras, my hypothesis should be discarded since both ferns look the same, yet the *Flora de Chile* uses this angle as a distinguishing feature! Luer's flora indicates that if the fertile fronds are much longer than the sterile and the stipes are blackish, it is *B. penna-marina*. Neither of the latter characters is very helpful if some stipes are black and fertile fronds are only a bit longer than the sterile because it could be either species.

Certainly the proportions need quantifying, viz: *B. penna-marina* has fertile fronds 1.5x to 3x longer than the sterile fronds, whilst in *B. microphyllum*

Blechnum penna-marina

Blechnum microphyllum

the ratio is 1.3: 1. Putting together all the descriptions and diagrams available, the only characters which seem viable for discrimination are those of the lamina. That of *B. penna-marina* is sharply acuminate, pinnae diminshing at the base and the fronds are linear whereas *B. microphyllum* is more oblong-lanceolate and although abruptly narrow at base, is broadly attenuated towards the tip of the blade. If you can be bothered to count pinnae, 45-55 pairs would indicate *B. penna-marina* and 25-30 pairs *B. microphyllum* which also has a crenate distal edge. Additionally, in humid places *B. penna-marina* is the more likely, but in dry places its twin should be found.

It doesn't help that the floras contradict each other over some features of *B. microphyllum*. The indusium has unfringed edges in *Flora Patagonica* and a cut edge in *Flora de Chile*. *Flora Patagonica* has ovate chestnut scales on the rhizome and Luer describes sharply pointed, triangular, clear coffee scales. I sometimes wonder if they are describing the same species.

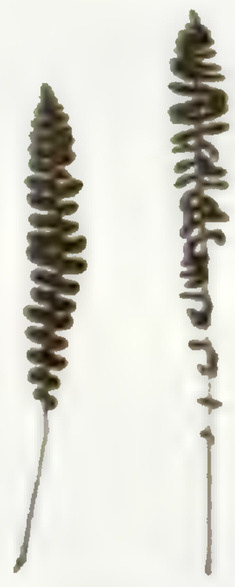
After registering a good specimen of each of these ferns in my memory, I should be able to pick them out from each other in the future yet without knowing exactly how. I feel frustrated that I can't give you a perfect recipe to use in the future for these very similar twins.

B. chilense - *B. magellanicum*

In the case of *B. chilense* and *B. magellanicum*, after reading their descriptions while in Chile and finding little of obvious usage, I drew up a table of features. This enabled me to spot the only real differences discernible in the *Flora of Chile* description: the character of the scales. Many of you may wonder why I have not yet mentioned trunks. If you have never seen a definitive *B. magellanicum* nor a *B. chilense* with a trunk and you haven't got to grips with the other characters, when you find your first blechnum with a trunk of say 0.5 m in height, it's impossible to say which fern it is. Mark Morgan and I puzzled over several medium-sized specimens in Huerquehue National Park, calling them all *B. chilense/magellanicum*. It was only later that it became obvious that we had seen two different species in Huerquehue. Fortunately, in Parque Alerce Andina, we were left in no doubt of the name of the people-sized specimens of *Blechnum magellanicum*, glaring at us in the sunlight.

By my reckoning, the three critical characters are the scales, the 'quality' of the frond surface and the pinna attachment to the rachis. The scales of *B. chilense* are wide and clear chestnut colour and 1-2 cm across and those of *B. magellanicum* are like pig bristles, narrow (linear-lanceolate, similar to hairs) and dark coffee coloured. *B. chilense* has a dull surface whereas *B. magellanicum* is glossy and shines so brightly that it dazzles cameras. The pinnae of *B. chilense* are attached by a short stumpy petiole to the rachis whereas those of *B. magellanicum* are adnate.

Blechnum microphyllum x0.3



Blechnum penna-marina x0.3

Tables comparing diagnostic characters and 'line by line' translations from the Spanish descriptions of the 4 above-mentioned ferns can be read at www.ebps.org.uk. These are taken from *Helechos de Chile* by H.G. Luer; *Flora de Chile* and *Flora Patagonica*. In the *Flora of Tierra del Fuego* by David Moore, there are descriptions (in English) of *B. magellanicum* and *B. penna-marina*.

Blechnum chilense x0.2

Blechnum magellanicum x0.2

[*small fronds*]

Blechnum chilense *SCALES* ***Blechnum magellanicum***

Blechnum hastatum x0.25

Blechnum ?arcuatum x0.3

Blechnum blechnoides x0.3

Other *Blechnum* Species In Chile

The only other arborescent species is *B. cycadifolium*. This, together with herbaceous *B. schotti* and *B. longicauda*, are endemic to Islas Juan Fernandez, a long way into the Pacific Ocean and they need not concern us here beyond saying that there are around 50 fern species there, many of them endemic. If anyone else is tempted to make a pilgrimage there and/or to Tierra del Fuego, please would they contact me. It might be possible to organise a BPS trip.

Flora de Chile lists six further blechnums: *B. arcuatum*, *B. hastatum*, *B. blechnoides*, *B. asperum*, *B. mochaenum* and *B. corralense*.

***Blechnum hastatum* and *B. arcuatum*.** It was annoying to find that our first *Blechnum* on the Chile 2002 trip did not match identification criteria after two counts. Indeed, I thought the fern was a *Woodwardia* with its chains of sori and monomorphic fronds. It turned out to be *B. hastatum*.

B. hastatum and *B. arcuatum* are similar in having auriculate pinnae, but this feature is very exaggerated in *B. hastatum* (formerly called *B. auriculatum*). The latter's 20-30 pinnae are longer, falcate and pointed. Indeed the superior auricle is so exaggerated it makes the pinna point downwards. Sori only occupy a small area of the pinna and are covered by a long thin papery indusium. The fronds are lanceolate, distal pinnae are not imbricate and proximal ones reduce gradually. *B. arcuatum* has 50-60 auriculate, coriaceous pinnae with rounded/blunt tips. Sori are restricted to the sides of the central vein, with an indusium completely covering each side, and it has an entire border. Its fronds are linear with imbricate distal pinnae and its petioles reddish-coffee. It grows in sub-antarctic woods from 36° 51' - 42° 23'S.

Blechnum corralense. Fortunately for me all the other Chilean blechnums are markedly dimorphic, but unfortunately rather similar to one another with the

exception of the endemic *B. corralense*, which I have never seen. It might be difficult to spot since it is only 5 cm tall and delicate with transparent pinnae, living in small dark humid places where it forms small colonies and has a narrow distribution (region X). Fertile fronds are longer and wider than the sterile ones and it has large rounded-off hydathodes (structures involved with water loss, usually at margins of leaves). It occurs from Valdivia down to Rio Bueno and is the smallest species.

Blechnum asperum is described by Luer as '*semejante a B. blech-noides*.' How I hate that phrase. Although it translates literally as 'similar to *B. blechnoides*', to me it means 'only a few gifted people can tell the difference'. The sterile fronds are similar to *B. blechnoides* and can proliferate, by bending down to the soil and rooting. The fertile fronds are shorter with the fertile pinnae much less separate.

Blechnum leyboldtianum (*B. blechnoides*) Luer also described *B. leyboldtianum* as '*MUY parecido a B. blechnoides*' (greatly resembling *B. blechnoides*), so much so that *Flora de Chile* has included it under *B. blechnoides*, thus sparing my blushes. Fronds are "fleshy" (*carnosas*), the rachis is glabrous and the stipe is from less than 2 cm down to nothing. Fertile fronds are longer and wider than the sterile, with 10-15-20 pairs of adnate, obtuse, coriaceous pinnae and the fronds are oblong-lanceolate (pointed at tip of pinna or frond). Sori cover the pinna and there is a marginal indusium. Fronds could be described as pinnatifid rather than pinnate. This fern (*B. blechnoides*) reminds me strongly of *B. chambersii* in New Zealand.

Blechnum mochaenum has fertile fronds equal to or larger than the sterile ones, it is 40 cm or smaller, is coriaceous, and has small oblong hydathodes. Segments have two pairs of veins.

Chilean Regions, from north to south

I Tarapaca
II Antofagusta
III Atacama
IV Coquimbo
V Valparaiso
VI Bernardo O'Higgins
VII Maule
VIII Biobio
IX Araucania
X Los Lagos
XI Aisen
XII Magallanes

BLECHNUM DISTRIBUTIONS

B. arcuatum
Regions VII, VIII, IX, X, XI
B. asperum
Regions VIII, IX, X, XI
B. blechnoides
Regions VIII, IX, X, XI
B. chilense
Regions IV, V, VI, VII, VIII, IX, X, XI and Santiago
B. corralense
Region X
B. cycadifolium
Islas Juan Fernandez
B. hastatum
Regions IV, V, VI, VII, VIII, IX, X and Santiago
B. leyboldtianum
Regions VIII, IX, X
B. longicauda
Regions Islas Juan Fernandez
B. magellanicum
Regions VII VIII IX X XI XII and Santiago
B. microphyllum
Regions V VI VII VIII IX X and Santiago
B. mochaenum
Regions VII VIII IX X XI XII
B. penna-marina
Regions IX X XI XII
B. schottii
Islas Juan Fernandez

There are no blechnums on Islas Pasqua (Easter Is.).

GOOD BLECHNUM LOCATIONS

In 1995, on an Alpine Garden Society trip, I found many species of ferns generally and blechnums in particular between Cohaique and Puyuhuapi in region XI (Aisen), where *B. chilense*, *B. magellanicum* and *B. penna-marina* were seen frequently along roadsides. They even grew together in boggy areas or between rocks in a heavily wooded area alongside *Fuchsia magellanica*. These are the only three species of *Blechnum* which grow in the more southerly province of Magallanes (XII). Whereas *B. penna-marina* had reddish frond tips, those new fronds of *B. chilense* were strongly yellow copper, pink or red. New fronds of *B. magellanicum* were delicate pink mixed with soft yellow. On the BPS trip of 2002, *B. chilense* was seen in most national parks in central Chile from Alto Vilches (region VII) southwards. It extends from region IV to XI. *B. magellanicum* can definitely be seen in Huerquehue (region IX) and in Alerce Andina National Parks (in region X) over 2,000 m, although it grows from Santiago southwards.

In Parque Nacional Chillan (region VIII), it is possible to see both of the troublesome pair of small blechnums. *B. microphyllum* was found high up just below the summer snowline, near the

***Blechnum chilense*, with *B. penna-marina* in the foreground**

Termas de Chillan, whereas *B. penna-marina* was occasionally seen lower down in the woodland near streams and small cascades, then again in Parque Nacional Nahuelbuta (region IX). It is a southerly species and extends down to Tierra del Fuego (XII) from region IX. This was probably the second most frequent blechnum of the 2002 trip.

B. hastatum was first seen (in 2002) near the roadside in the area surrounding Cerro La Campana behind Valparaiso and then much further south in the park surrounding Vulcan Llaima in a wooded roadside (region IX). It extends a long way from region IV to X. According to our collection notes, *B. arcuatum* was found in the same place on Llaima. This seems unlikely, so I must assume that we couldn't tell the difference between it and *B. hastatum* there. *B. arcuatum* occurs from VII to X.

Parque Nacional Huerquehue (region IX) boasted *B. blechnoides* on its lakeside trail along with all the other blechnums. This park seems to have been the most successful location in terms of number of Blechnum species on the BPS trip.

So much of Chile at lower altitude is cultivated that a fern spotter needs either to climb into the Andes montane and sub-alpine forests or visit National parks and reserves in order to see much more than bracken. The fern flora is as rich as that of New Zealand in number of species but they are spread over a much larger and more diverse area, meaning that one has to aim for fewer species per visit or be prepared to travel long distances in this extremely beautiful and rewarding country.

***Blechnum magellanicum* fronds uncurling.**
Inset: New pink-copper frond of *Blechnum chilense*.

***Blechnum magellanicum* with trunk**

Acknowledgements
My thanks to Chris Green and Heidi Henson of the Biochemistry Dept. University of Cambridge for help with illustrations, 'Pepe' Vicente-Garcia of the same dept. for help with the Spanish translations and also Diana Henriquez from University of Venezuela. I thank my friend Arthur Williamson for drawing the map.

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A Fatal Dose of Extract of Male Fern is reported in the *Ceylon Observer*

This extract, kindly sent in by Madge Stokes, is taken from the *American Journal of Pharmacy*, vol. 55, 1883. The then editor John M. Maisch, M.D. included his discussion of the report, which had appeared in *Pharmacological Journal and Transactions*, 1882, in his column *Gleanings in Materia Medica*.

The prescription was dispensed as follows:

Extr. aeth. Filic. Mar.[1] 1½ oz.
Pulv. Kamalae[2] 3 drachms
Mucil. Acac.[3] Syrup simpl. aa q.s.
Aquae Cinnam.[4] ad 4 oz.

M.S. Half to be taken at bedtime and half at 2 a.m.

Maisch observed: "The dispenser left out powdered pomegranate root, 3 drams, signifying that be done so to the prescriber. After taking the first dose, the patient was so distressed, that he sent to the prescriber to know whether he should take the remainder, and received an answer in the affirmative. He did so and the tapeworm[5] was expelled, but the patient became worse with vomiting and purging, and died in a few hours.

"The prescription as actually dispensed closely resembles one attributed in Naphey's "Medical Therapeutics" (6th edit. p. 331) to the late Dr. William Brinton, who, it is there said, "believes this superior to all other combinations for the ejection of tæniæ." The dose is precisely the same in both cases[6], but in the book it is possibly a misprint for 1½ drachms."

The unfortunate patient seems to have received sixteen times the recommended dose!

NOTES

[1] presumably the male fern extract (species?); [2] A fine orange-coloured powder consisting of the glandular hairs from the fruit capsule of an East Indian tree (*Mallotus phillipinensis*), a vermifuge; [3] *Acacia* mucilage? [4] Presumably an infusion of cinnamon; [5] *Tænia solium*; [6] 1½ ounces!

KILLARNEY FERN CONSERVATION

by 'Sentinel'

Killarney fern *Trichomanes speciosum* Willd. has courted controversy and has possessed an air of mystery for many decades. In the UK, this fern has always been considered a rare plant and the sporophyte became extinct at many sites due to the activities of collectors. (Ratcliffe *et al.* 1993; Roberts, 1979). The fern is listed as vulnerable on the GB and Irish Red Lists and rare on the IUCN global Red Data List. To date, two sites in England and three in Wales have been notified as Special Areas of Conservation (SACs) because they support sporophyte colonies (sexual stage) of *T. speciosum* (see JNCC website). It is generally accepted that it is the sporophyte generation which should be targeted for these special protection measures in Britain. The fern is now subject to a species recovery programme initiated through the UK Biodiversity Action Plan (1995).

However, even with all this protection and site safeguard, the exact number of sites in Britain, which support the sporophyte generation of the fern, is still not accurately known. To complicate matters further, independently growing gametophytes were discovered relatively recently in the British Isles (Rumsey *et al.* 1991) and this has invoked considerable interest again in *T. speciosum*. Due to necessary secrecy, the location of some of these sporophyte sites is, perhaps, a conservative estimate of the true situation.

The wider distributional pattern of the gametophyte compared to the sporophyte has allowed more meaningful experimental work to be carried out on *Trichomanes* populations. Rumsey *et al.* (1998), using allozyme electophoresis techniques, have studied the genetic variation in *T. speciosum* in Britain, the Azores and mainland Europe providing information on population centres and spread of this species. These cytological studies have also shown that there is no genetic reason limiting the production of the sporoprophyte generation from the gametophytes and that the two generations, where found together, are genetically identical.

Over the last two decades, with careful management & natural changes, there has been an increase from two sporophyte colonies producing 37 fronds in 1984 to eleven colonies in 2001 with over 500 fronds.

However, because of the rarity of the sporoprophyte and its perceived sensitivity to alterations in microclimate etc., it has been difficult to carry out any ecological studies on this stage in its natural environment. One of the most striking features of the ecology of the fern was the remarkable variation in its habitat requirements, which ranges from deeply shaded very wet areas by waterfalls to more open situations on woodland banks (Ratcliffe *et al.*, 1993). The sporophyte has been recorded from a wide variety of rock types ranging from granite to sandstone. The majority of populations studied are strongly associated with particular bryophytes e.g. *Jubula hutchinsiae*, *Thamnobryum alopecurum*, *Conocephalum conicum*, *Riccardia chamedryfolia* and *Pellia epiphylla*, which are all common and widespread in the moister parts of Britain and Ireland and in wooded areas with plants such as *Oxalis acetosella*, *Chrysosplenium oppositifolium*, and *Dryopteris* spp.

The sporophyte generation is remarkably easy to culture under controlled conditions (Rutherford 1990; reported in Rumsey *et al.* 1992), and there is now great emphasis placed on transplantation as the key basis of a recovery programme for *T. speciosum* and hence species survival (UK Biodiversity Action Plan). Thus, a great deal of scientific information has been made available in recent years on aspects of genetics, cytology and ecology of both generations.

Very little work has been reported on how the fern performs in sites over time. It was because of this that your editor approached the authors (who publish this under a pseudonym to protect the location of the fern) to outline their findings on a previously unreported site which supports both generations of *T. speciosum*. Our data may be mirrored at other locations supporting Killarney fern and, more importantly, should have a bearing on the actions outlined in the UK Biodiversity Action Plan for this species.

THE STORY UNFOLDS

When the authors visited the site in 1984, we literally fell down a short length of the slippery wooded slope into the stream. Whilst recovering, we spotted a fern colony growing underneath a rocky overhang directly above the watercourse. The fern was totally hidden by a mass of overhanging vegetation of herbaceous

THE SITE

The story started in 1984 when the authors were surveying a wooded river valley for its bryophyte interest. The valley is coastal, fairly steep sided, aligned north-south and the underlying geology is a localised outcropping of slightly base-rich fractured rock. The woodland is ancient semi-natural, now dominated by ash (all elm died off in the 1970s). Some sycamore and beech are present and hazel is dominant in the understorey. The ground flora is dominated by ferns (*Polystichum setiferum*, *Dryopteris affinis*, *D. filix-mas*, *D. dilatata*, and *Asplenium scolopendrium*) with higher plants such as *Hyacinthoides non-scripta*, *Mercurialis perennis*, *Primula vulgaris*, *Arum maculatum* and *Brachypodium sylvaticum*. In the wetter areas bordering the watercourse, *Allium ursinum*, *Chrysosplenium oppositifolium* and *Ranunculus ficaria* (both sub-species) dominate. The bryophyte flora is fairly diverse with *Eurhynchium striatum*, *E. praelongum*, and *Hookeria lucens* in the woodland and *Plagiochila asplenioides*, *Thamnobryum alopecurum*, *Pellia epiphylla*, *Conocephalum conicum*, *Fissidens adianthoides* and *Rhizomnium punctatum* in the wetter areas bordering the stream The minor stream is relatively short in length, rises below 100 m and discharges directly into the sea.

Dairying is the major agricultural activity in the area with numerous farms in the catchment, especially near the headwaters. Industrial premises discharge into the top of the catchment but apart from one major farm pollution event in 1993 the water quality of the stream (which supports a range of mayfly, stonefly, and caddis spp.) has been good over the last 20 years.

- Since 1997 ten new sporophyte colonies have been found -

plants, brambles, and fallen trees (living and dead), which trailed into the stream.

Further investigation resulted in the discovery of a second colony (Colony 2) 20 m downstream of the original find. This second colony was growing in a hole in the bank 2 m from the water's edge, which had nearly been totally buried by a landslide. Over the top of this spoil lay a mat of living and more dead herbaceous material, bramble and fallen trees, all of which was very unstable and near collapse, risking complete burial of the plant. Accessing both colonies was difficult (due to the tangle of vegetation) and fronds from both colonies were very small, misshapen and didn't much resemble fern material at first sight. Sample fronds had to be sent away for identification, and once our material had been positively confirmed as the Killarney fern, books were consulted and the enormity of the find sunk home!

All texts highlighted the need for total confidentiality so we couldn't even seek experts' advice on what to do. We felt that something had to be done to try to save the two colonies as one was immediately at risk of fatal burial. The other was totally enmeshed in a matrix of plant debris which itself trailed into the watercourse. We were afraid that the whole colony would be ripped out, rhizomes and all, should this vegetation be dislodged by large floating objects in the stream at times of high flow (logs, fridges, etc.). The scientific literature also highlighted that this fern "was extremely sensitive to changes in microclimate"; "alterations to habitat" etc. so that any work done to try and safeguard the fern had to be carried out in an extremely sensitive manner and be thoroughly thought out beforehand.

So, from spring 1984 to 1994 small amounts of material, which were "interfering" with both sporophyte colonies, were removed bit by bit on an annual basis. With Colony 1, fallen timber was removed at the first visit followed by removal of bramble over the next four years, followed by pruning of the overhanging vegetation. With Colony 2, fallen timber was totally removed at the first visit and the soil and vegetation above the entrance to the hole stabilised over a period of two years by compacting the material to consolidate it. Thereafter, accumulated soil was removed from the entrance, 1-2 cm depth at a time over five years, and overhanging vegetation trimmed above the entrance. Colony 2 proved difficult to work with, as the hollow containing the fern was initially only about 10 cm high most of which was surrounded and backfilled with loose soil. Because of this, living and dead fronds were covered with soil and removing the soil from around the fronds was difficult, as many had already detached themselves from the rhizome. However, removing material from the hole entrance over this long period of time eventually resulted in the formation of a small cave lined with rock 20 cm high, 1 m wide and 30 cm deep. For ten years work focused on just ensuring the survival of the two colonies.

PHOTO: TESSA HILL

***Trichomanes speciosum* at another UK site in 1970**

In 1994 the authors became more ambitious and embarked on some simple monitoring work (recording frond length and number) which was repeated on an annual basis (every January 1st). The results show that with both colonies frond number has increased significantly over the past nineteen years. The number of fronds increased from 20 to 108 in Colony 1, and from 17 to 108 in Colony 2. This year (2003) the frond density was so high in Colony 2 that counting had to be abandoned.

Not only did frond number increase but also there was a general trend towards a higher maximum frond length over time The longest frond recorded from Colony 1 was 45 cm in 2003 compared to a maximum frond length of 29 cm in 1994. Similarly, a frond length of 36 cm was recorded from Colony 2 in 2001 whereas in 1994 the longest frond measured was only 20 cm. Only once were sporangia noted - on one frond in Colony 1 in 1999.

Further work within the whole valley is not possible because all of the land is in private ownership and access difficult. However, limited survey work is possible 100 m upstream and downstream of the two existing *Trichomanes* sporophyte colonies. During 1997 a new sporophyte colony was found growing 10 m downstream of Colony 1. It had six fronds and was directly associated with gametophyte material.

There was no evidence to show that this colony arose from the rhizome system of Colony 1. Since then ten new sporophyte colonies have been found.

The year 2001 was very significant in terms of changes in fern biology at this site. In total, eight new sporophytes were discovered. Two of these (colonies 10 and 11) were mature, with frond numbers totalling 97 and 152 respectively. These were obviously colonies which originated post 1995, which was the last time we checked this particular stream section. Of greater significance was the presence of new juvenile sporophyte colonies 6, 7, 8 and 9 with immature fronds up to 25 mm growing directly from masses of gametophyte tissue.

Two other new colonies (4, 5) had seven and nine fronds respectively and these measured up to 14 cm in length, indicating that these perhaps were fronds which were produced some months previously. Colonies 10 and 11 are located immediately adjacent to the watercourse (the tops of the colonies *ca.* 30 cm above water level). As a result, quite a large proportion of the fronds of both these colonies are deeply submerged during the winter. With both these colonies the rhizome systems are anchored to rock and are invading nearby soil.

The other newly formed colonies (4, 5, 6, 7, 8, 9) are all relatively close to existing mature sporophyte colonies but are separate entities and do not arise from an existing rhizome system. All the juvenile colonies are located on the west-facing rocks, but none occur in the immediate vicinity of mature sporophytes where clearance/management work had taken place over the last 19 years. The emergence of new sporophyte colonies arising from the gametophyte tissue is very exciting and very encouraging.

The distribution of the perennating gametophyte stage at this site is localised but extensive. It is found within the entire 100 m length of the stream corridor which supports the sporophyte, and only extends *ca.* 20 m beyond.

Gametophyte patches range in size from a few square centimetres to sheets covering large patches of rock and even bare soil. In some places the gametophyte is so extensive that it hangs off vertical rock faces and pieces fall into the stream Most of the gametophyte is confined to the west-facing side of the stream where there is an appreciably higher bank (2-6 feet high) with more exposed rock. In some

KILLARNEY FERN

New sporophyte with its gametophyte of origin, 1997

areas the gametophyte grows in very open conditions with high light intensity but it is also found to a lesser extent within dark crevices. The only obvious feature regarding its distribution is that it tends to be found in "drier conditions" where there is a total absence of competition by mosses (especially *Heterocladium*). Neither is it found in areas where it is subjected to periods of inundation by stream water or in wet seepage areas on rock faces. The rate of growth of the gametophyte is noticeably slower in very dry situations. For example, a single patch of gametophyte (the size of a 50p piece) present adjacent to sporophyte Colony 1 has not increased or decreased in extent since 1984, which is in contrast to patches of gametophyte in more open conditions.

In 2003 the authors noticed that two quite large patches had developed in an area previously devoid of gametophyte. Only once (1995) has the gametophyte been examined microscopically (for confirmation purposes). Abundant antheridia and gemmae were found, but no archegonia. Gametophyte patches occur in intimate contact with or in very close proximity to all the sporophyte colonies.

THE DOWN SIDE

Dramatic events, which had a major impact on both stages of the *Trichomanes* population in the valley, were to occur during autumn and winter of 2001-2002. The autumn of 2001 was very wet indeed with prolonged periods of heavy rainfall which resulted in saturated soil conditions. There were also frequent periods of very strong winds. Many trees blew down and the streambed was littered with logs, branches and domestic items such as tin sheets, discarded microwave ovens, plastic bags etc.).

Also, many trees had fallen and their trunks had straddled the stream with branches in the watercourse trapping such debris. One tree slipped sideways off the bank into the stream, root system as well, and during the process of leaning over had trapped a cooker and wheelbarrow! This entirely blocked the stream, which in turn caused gravel to be deposited upstream. The bed level rose 60-90 cm over a distance of 20 metres, levelling off to the natural gradient for a further *ca.* 50 m. To make matters worse, this dam formed only 5 m downstream of colonies 3, 8 and 9 and 10 m downstream of Colony 1.

Thus, on the day of the visit, the raised bed level resulted in colony 1 being *ca.* 90 cm closer to the water level than ever before and many fronds were now touching the water surface (normally the colony is at head height). Colonies 3, 8 and 9, originally located on the bank about 30 cm above the normal water level, were completely buried by debris. It should be noted that this was the 1st January in freezing cold conditions! Subsequently we revisited the site on three weekends spread over a six-week period and removed fridges, galvanised sheeting, logs, and dug out about 15-20 tonnes of gravel from the streambed, which was brought back to its original bedrock level over a distance of *ca.* 50-75 m. On the final weekend, during the last hours of clearance, work had to be halted immediately when, even under high stream flows, the form of a green filamentous growth resembling *Fontinalis* became visible when uncovered from a mass of gravel. Closer examination showed that the 'bryophyte' was in fact sporophyte colony 3! The fronds were matted together by fine silt but still bright green in colour and attached to the rhizome. The colony was washed, and the fronds were separated out and held above the water level until the stream level dropped (due to final removal of debris). We immediately searched this area for colonies 8 and 9, but to no avail. Colonies 10 and 11 were also checked out further down the valley and, although they were still extant, they were completely submerged by the high stream level and entangled in debris, logs etc., and at risk of being completely dislodged and washed away. Here, debris was removed from these two colonies but work proved difficult as they were totally submerged.

So, autumn and winter 2001-2002 proved to be catastrophic in terms of the fern. Not only had two juvenile sporophytes been lost, but quite substantial areas of gametophyte were also affected at certain streamside locations. Physical scouring and burial by gravel due to increasing the height of the stream resulted in the loss of around five square metres of gametophyte. So it was with heavy heart that we approached the 2003 monitoring season.

FINALE

However, good news!! To our delight Colony 3 was flourishing and now has 18 fronds, some recognisable from the previous year. We also managed to relocate Colony 8, which now has 5 fronds, but unfortunately Colony 9 has not been seen again. It is still impossible to count fronds from Colonies 10 and 11 as they remain partially submerged, and Colony 2 is doing well, so well in fact that it is now impossible to count the fronds accurately because of their sheer density. Also two new previously unrecorded juvenile sporophytes came to light.

The number of sporophyte colonies at our site seems to be exceptional. Ratcliffe *et al.* (1993) record 13 colonies for the whole of England, Wales and Scotland whereas we have recorded up to 13 at our site alone!

All the newly emerged sporophytes have established themselves and are producing new fronds, now on an annual basis. It seems that perhaps an initial period of establishment is needed before the rhizome produces extra fronds with regularity.

During the last nine years we have attempted some basic form of monitoring and would have been prepared to carry out tagging work on the fronds to get an estimate of frond growth rate, survival etc., but were refused a license to work on this species (ironic after 19 years of learning about and caring for this treasure!).

When disaster struck this site in 2001/2002 it took three weekends of toil to rectify the problem. In 2003 more stream clearance work was necessary to avoid another disaster. As each year passes, more material, natural deposits and fly tipped waste, ends up in the stream. We are unable effectively to remove this detritus because proper equipment (chain saws, winches, skips etc.) is required.

A major problem is that the land is under private ownership and access is 'awkward'. This is where the British Pteridological Society can play a part. The two owners of the site have indicated that they are willing to sell the land for a reasonable price and the purchase of the eight acres of land involved (i.e. <u>all</u> the woodland) would not be expensive. Purchase would make management of the

site so much easier and attract Biodiversity money from conservation agencies to help with the management costs. The trade-off for writing this paper is a plea for help to purchase and manage the site. The authors are aging and are increasingly less able to carry out the physical work required to ensure that *Trichomanes speciosum* survives at this exceptional site well into the future.

The authors would like to thank all those friends and colleagues who have helped and advised over the years and who will still remain anonymous. Unfortunately, they cannot be named if the location of the site is, as is proper, to be kept secret. Special thanks go to James Merryweather and Fred Rumsey for encouraging the authors and providing specialist advice. The authors also acknowledge the help they have received from staff of the Countryside Agency and Environment Agencies who have sorted out problems as they have arisen over the last nineteen years.

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BPS Special Publications

May be purchased from BPS Booksales

see opposite page 64

BPS Special Publication No. 1.

A Guide to Hardy Ferns **by Richard Rush**

(1984, reprint 1987), 70 pages. ISBN 0 9509806 0 9

[No longer in print but sometimes available second hand at BPS meetings and elsewhere.] The book lists, in alphabetical order, 581 species of British and foreign ferns that can, or potentially could, be cultivated in British gardens. Typically it gives a one-paragraph description of each species, its country/continent of origin, its habitats, and the recorded experiences of hardiness by fern growers in the UK. No illustrations.

BPS Special Publication No. 2

Fern Names and Their Meanings **by J. W. Dyce**

(1988), 31 pages, £4.50 plus p&p. ISBN 0 9509806 1 7

Provides explanations for the naming of the genera of British ferns, in alphabetical order from *Adiantum* to *Woodsia*; also the meanings of Latin and Greek prefixes in fern names (e.g. *Crypto-*, *Oreo-*, *Tricho-*). Contains a dictionary of the taxonomic words used to describe fern fronds and other anatomical features. Illustrated with line drawings.

BPS Special Publication No. 3

The Cultivation and Propagation of British Ferns **by J. W. Dyce**

(2000), 41 pages, £5.00 plus p&p. ISBN 0 950806 2 5

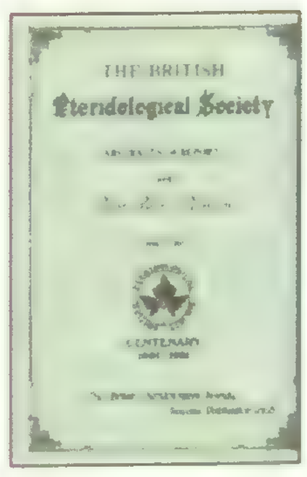
After a brief introduction to fern anatomy and life history, the main part of this publication deals with fern habitats in the wild and the cultural requirements needed in a garden. It describes how to grow ferns from spores, vegetative propagation, and the few diseases to which ferns are liable. It goes on to recommend the species and cultivars suitable for different habitats within a British garden, and the best of the foreign hardy ferns. Illustrated with black and white photographs.

BPS Special Publication No. 4

The History of British Pteridology **edited by J. M. Camus**

(1991), 127 pages, £6.00 plus p&p. ISBN 0 9509806 3 3

This multi-author work by leading pteridologists was produced to mark the Centenary of the BPS in 1991. Wide-ranging and very readable, it provides a satisfying overview of the personalities and developments that shaped the BPS. From fossil ferns through antique books, to conservation and horticulture, it gives essential background information on pteridology, including a summary history of the BPS, through the eyes of fern enthusiasts. Illustrated with black and white photographs.



BPS Special Publication No. 5

The British Pteridological Society, Abstracts and Reports, 1894-1905

(1991), 245 pages, £7.50 plus p&p. ISBN 0 9509806 4 1

A facsimile compilation of the reports and papers produced by the BPS during its early years and before regular journals or magazines had been established. It describes the meetings and interests of fern growers from over 100 years ago and their experiences on field excursions, and especially with the finding and growing of cultivars of British ferns in the late Victorian era. Illustrated with black and white photographs and engravings.

BPS Special Publication No. 6

The BPS Minute Book CD (1891-1983) **ed. by Barry Wright**

(2002), 633 facsimile pages on CD-ROM, £10 plus p&p. ISBN 0-9509806-5-X

This unique pteridological archive documents the birth and changing fortunes of the BPS – the world's oldest Fern Society - as recorded in 93 years of the BPS Committee Minute Book from 1891 to 1983. The original Minute Book itself – the Society's most valuable document - exists only as a single 3-kg bound volume with marbled covers and ruled lines. Entries are in handwriting in the early years and as stuck-in typescript later. The CD facsimile presents all the 633 pages of recorded Committee deliberations up to 1983.

THE HIDDEN WORLD OF FERN SPORES

Barry Wright

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Tockwith, YO26 7PU

Ferns are classified as being vascular cryptogams. the Greek, *cryptogam* literally means "hidden marriage", which reflects the minute scale of the reproductive cycle of ferns; so small that it was hidden from view until microscopes opened up the possibilities of study. The microscopic nature of the spores and the smallness of the prothalli mean that few people have the opportunity to appreciate their beauty.

My interest in fern spores stems partly from my *anoraktic* (the first of my made-up words that seem to work) quest for knowledge and partly from a need to check up on some of the spores donated to the Spore Exchange. Some members were reporting that every time they sowed *Woodsia alpina* or *Woodsia ilvensis* from BPS spores the species that came up was always *Cystopteris dickieana*.

Very often, flowering plant keys refer to the seeds as providing diagnostic characters to aid identification. Why didn't fern books do the same? Surely the spores of different species are distinctive? I was curious to know whether the spores of different species within a genus were diagnostic and, more importantly, were there differences between varieties and/or cultivars? Or, was it too much to expect differences between species; are the differences only significant at the family level? It would be very helpful if the spores of cultivars and varieties could be separated, to check on the spores received for the Spore Exchange.

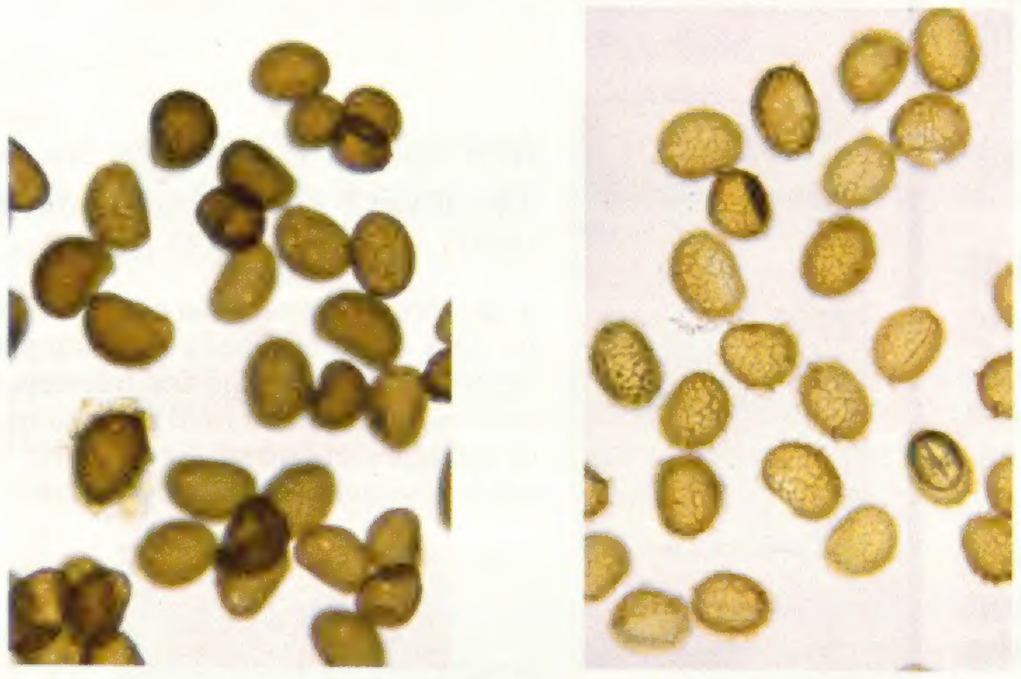
This interest opened up a whole set of problems to overcome. To start with, I could find little information on spore morphology. A few keys did refer to spore size, colour or ornamentation, but not many. I could not find much information about how to make permanent mounts of spores apart from using Gum Chloral mountant.

To be able to study differences in spores it would be essential to create a reference collection of spores with which to compare new donations. My ignorance on this aspect was rectified when I joined the Leeds Microscopical Society - no wise-cracks about it being a very small society or that the members are all vertically challenged please! Over the last few years I have slowly become better at mounting spores and developed a technique that is both simple to do and effective. The main problem was achieving a near monolayer of spores on the slide.

The alternative is to have the spores distributed throughout the thickness of the mountant under the coverslip, which means that there are very few spores in focus at the same time and spores near the top produce a blurred image when the focus is set lower down. This makes photomicrography very unprofessional-looking.

MAKING A SPORE MONOLAYER

To get a near monolayer the following technique seems to work best. Make a prepared slide by smearing a very small amount of glycerine jelly mountant onto the centre of the slide. This smear needs to be slightly smaller than the diameter of the coverslip. I find a 16 mm circular coverslip works well. To get the glycerine into the centre of the slide and inside a 14 mm circle requires the use of a felt-tipped pen (indelible is better than water based and the circle can still be removed later using Methylated Spirit or Isopropyl Alcohol (IPA)) and a "ringing table". This is like a small record-player without the stylus. It has clips to hold the slide and is normally used to paint a sealant around the coverslip to prevent the mountant shrinking under the coverslip as solvent in the mountant evaporates off. Sealant also holds the coverslip in place if the slide is to be stored on its edge.



Photomicrographs (x400 enlarged) of spores of:
Woodsia alpina ***Woodsia ilvensis***

To create a 14 mm circle, first make a dot in the centre - on the underside of the slide. To do this, it is important to ensure that the upper-side can be identified. This is done by placing a dot in the top right-hand corner using the felt-tipped pen. Now it is always possible to identify which way is up by following the convention:

top-right = up

The centre dot can now be marked on the underside. This is done by tracing round a slide onto a piece of white card and drawing the diagonal lines. Where they cross is the centre. The slide is placed face-down on the card and the centre point marked using the felt-tipped pen.

Ringing tables normally have concentric rings marked on them and a centre mark. If needed, a circle of 14 mm diameter can be added to the platter by marking the 7 mm radius, spinning up the platter and marking the circle using the radius marked on the platter. Place the slide, face-down again, with the centre of the platter lined up with the centre-point on the slide, spin the table and draw the 14 mm circle using the underlying 14 mm circle on the platter as a guide.

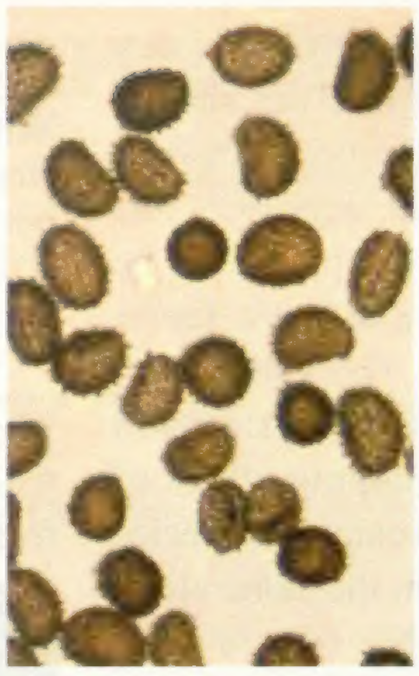
The jelly can now be added to the centre of the slide after first preparing a "stock slide". Melt a little glycerine jelly, about the size of a small pea, on a clean slide using a hotplate or spirit burner. Dab a little finger into the jelly (hopefully it is not too hot) and smear the jelly onto a second slide. This reduces the amount of jelly and provides better control over the amount applied to the prepared slide that will have the spores added to it. This technique is known as the "smear of a smear". Picking up a smear from the second slide will normally provide enough to put into the circle on the prepared slide. As the jelly is used up on the second slide it is topped up from the first one.

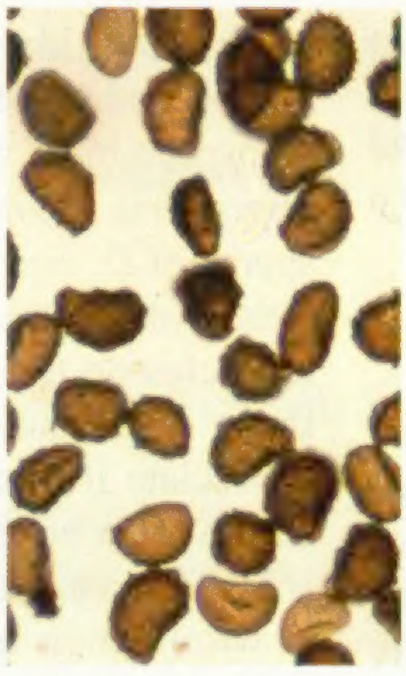
Turn the prepared slide face-up (top-right = up). Take a small smear of jelly from the second 'smear' slide and smear this into the centre of the marked circle, taking care not to get any jelly outside the area.

Now the spores can be mounted. Providing the prepared slide is reasonably freshly made the spores will stick readily to the surface. Otherwise warming the slide with a spirit lamp or cigarette lighter will soften the glycerine jelly and make the surface sticky again. Drop some spores onto the jelly and blow off any excess that either missed the jelly or didn't stick to it. It reminds me of making Christmas cards at primary school

and applying the glitter to the glued surface. We're all just big kids at heart!

The spores are now reasonably well stuck onto the surface of the jelly. As an extra precaution the jelly can be warmed again to soften it and hopefully provide even better adhesion. Some authors recommend using a small roller to press spores into the jelly. That seems a bit over the top.





Photomicrographs (x100 greatly enlarged) of spores of: *Cystopteris fragilis* *Cystopteris dickieana*

PERMANENT MOUNTING

The next problem is the hydrophobic nature of the spores. The simplest mountant to use would be an aqueous preparation like the *Aqueous Mountant* supplied by Northern Biological Supplies, but most spores seem to be decidedly hydrophobic and applying an aqueous mountant directly to them produces vast numbers of air bubbles and a totally useless slide. This hydrophobic nature seems to be produced by oils or fatty substances on the surface. Washing with Meths or IPA seems to fix the problem. This can easily and economically be done by dispensing the IPA from an old Inkjet cartridge refill bottle. These are small plastic bottles with concertina sides and a blunt hypodermic needle on the top. Thus the spores can be irrigated with the minimal amount of IPA necessary to remove the oils. The alternative would be a bulb pipette. For some curious reason the spores stay stuck to the jelly if IPA is used, but trying to replace the IPA with water, in order to use an aqueous mountant, immediately dislodges all the spores. I can discover no reason for this.

Having removed the hydrophobicity (probably not a real word but another one that works for me. *Hydrophobia? - ed.*), the mountant can be applied. There are two choices, either an alcohol or xylene ☠ based formulation. Purely by chance I discovered that, after washing with IPA, the slide could then be washed with xylene - without the spores drifting off into the discard bottle. At first the xylene forms globules on the surface showing that it is immiscible in IPA, but very soon it flows across the slide smoothly, indicating that it has replaced the IPA. Replacing the alcohol with xylene means that xylene-based mountants like Canada Balsam can now be used. Before discovering this, I used a special mountant called Dimethyl-hydantoin-formaldehyde ☠ or DMHF for short - which is not a railway station in Wales. This is basically a resin dissolved in 70% alcohol until it is the right consistency - runny treacle. This has the advantage that, being in 70% alcohol, it is compatible with specimens prepared in both alcohol and water. The resin itself is difficult to obtain in this country, but a contact in the microscopical society managed to secure a small amount, enough to last me until 2525 *anno domini*.

Whichever is used, a small blob is put into the centre of the circle of the slide and the coverslip applied. The coverslip can be applied either by carefully lowering it onto the mountant with a pair of very fine forceps or the upside-down way of placing the coverslip on a low pedestal turning the slide over and lowering the slide onto the coverslip. If the mountant is not too runny, the coverslip will not slip off as the slide is turned back. Careful prodding and moving the coverslip with a mounting needle will squeeze the mountant out to the edges and the coverslip can be centred relative to the marked circle on the underside of the slide.

Providing the mountant was not too generously applied, the slide is ready for labelling and ringing. Otherwise the excess mountant will need to be cut away after the mountant has been allowed to harden for two to four days. This is best done using a scalpel or craft knife.

Stick-on slide labels can readily be bought. These could be placed at one, or both ends of the slide, depending on the amount of information needed. At this point the centre dot, circle and the dot in the top right corner of the slide can be removed.

☠

Both xylene and formaldehyde (formalin) are very harmful. They should be used with extreme caution and, if possible, alternatives should always be sought - ed.

After about five days the mountant will be hard enough to apply the sealing ring. There are lots of fancy preparations like zinc white and shellac that can be used. I prefer Humbrol enamel paint. It is readily available, cheap, the brushes are easy to clean and it comes in a range of snazzy colours. I use British Racing Green - No 3 - for fern spores. I did consider fluorescent pink, but decided that was a bit too much and went for the more restrained, boring green. Using Humbrol paint does offer the opportunity to colour code the slides. Green for spores, blue for freshwater animals, yellow for pollen etc.

This may all seem a bit complicated but, compared with some of the alternatives, it is a doddle and large numbers of slides can be made with little effort and faffing around. This means that my large collection has developed alarmingly quickly, posing yet another problem of how to store them alphabetically so that new acquisitions can easily be inserted without having to shuffle lots of slides from one tray to the next to make room. I am now using a card index where the slides are stored vertically, four to a card on modified index cards that are roughly A6 size (6" x 4" or 150 mm x 100 mm). These cards have four little pockets along their bottom edge into which the slides slot, with the label at the top where it can easily be read.

EXAMINING THE SLIDES

Now the slides are prepared they can be examined. I use a trinocular compound microscope and find that most spores can be viewed at magnifications from 100x to 400x. At these magnifications the depth of field is tiny. This means that either the top of the spore can be focused on, or the middle, but not both at the same time. This makes photomicrography difficult as it requires making several exposures at different focal points to produce a sequence of pictures to gain an impression of the ornamentation over the surface of the spore. My microscope has graduations on the fine focus knob. What I do is focus on the top of the spore and take a picture. Then I lower the focus by a fixed number of units on the focus knob and take another shot. I continue until the focus is at the equator of the spore (technically this is called the optical section). This normally produces 6 - 12 pictures that can be printed out to make it easier to compare each and

gain an impression of the characteristics of the ornamentation. Expensive software exists that would use these images and take the 'in-focus' parts of each and produce a single composite image in sort of 3-D.

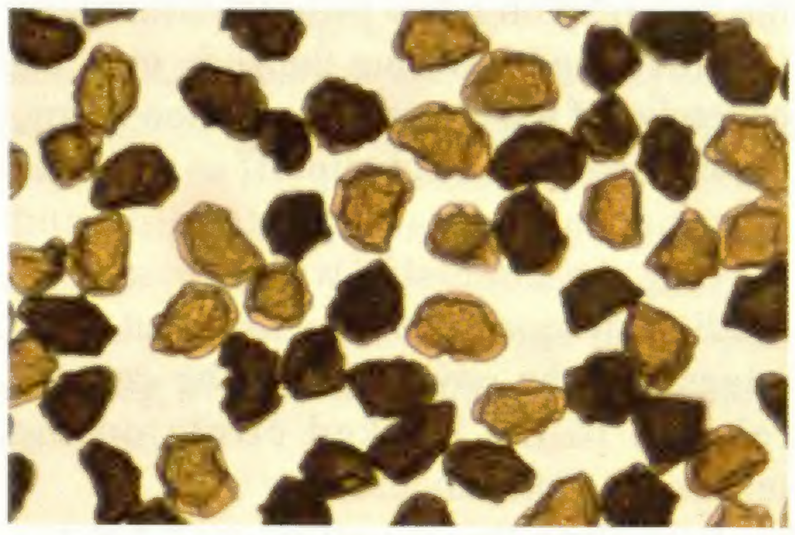
APPLYING THE METHOD

After all the effort of preparing slides and taking pictures the real value of the whole system comes into play. When spores come in for the exchange I try and make a microslide of each donation, particularly if it is a taxon we have not had before. I also make slides of others on a less rigorous basis. This is to compare successive donations. As I do not possess an atlas of fern spores I start by assuming that the taxon donated is correctly named. If we get the same taxon donated by a different donor I compare the two. If the spores look the same, we can be reasonably confident that the name is correct. As this acquisition progresses, confidence increases. The value of doing this is that, at some point, a taxon may be donated where the spores do not match all the previous samples. This will suggest one or other is not true to name and we can investigate which name is correct. This is the situation with Woodsias. We now check every donation of *Woodsia ilvensis* and *W. alpina*. The spores of these species are easy to distinguish from spores of *Cystopteris dickieana* and *C. fragilis*.

Mounting spores also reveals contamination. When collecting spores in a fern-filled garden, or even in the wild, there will always be stray spores from nearby plants on the frond collected. Unless these spores are washed off before allowing the frond to dry out and harvest the spores, the stray species will end up in the spore donation. This is not normally a problem as the 'collected' species will be dominant when sown. Occasionally the contaminant species could be more viable or aggressive, germinate earlier and/or grow more rapidly. It could be a related species and could produce an unintended hybrid. When examining some donations it is interesting to see how many contaminating species there are and it is a challenge to try and work out what they might be. The record so far is a sample with five contaminating species. This may help some growers if they get a *Dryopteris* coming up in a *Polypodium* pot. At least I may be able to tell them that there were *Dryopteris* spores in the sample and that it was not their unsterile sowing technique.

When experimenting, I tried mounting two species together on the same slide by mixing roughly equal quantities of dry spores before sticking them to the slide. I knew that there were differences between *Dryopteris dilatata* and *D. expansa*. The spores of *D. expansa* were supposed to be lighter than *D. dilatata* and have fewer tubercles on the surface. The subtlety of these differences might be difficult to appreciate if it meant swapping slides of each type. A better way to compare species would be to mount both on the same slide. It would then be possible to see both species in the same field of view, even at high magnification, if the spores were evenly mixed at an approximate 50:50 ratio. Those who study pollen often use a reference pollen like hazel mixed with the sample pollen as a background to provide a scale with which to compare the sample pollen.

This was done with donated spores of the two species. When examined there was no discernible difference! This meant that one sample was incorrect, the *D. expansa*, as all the spores were dark and many tubercled. Mixing another sample with *D. expansa* from a different donor revealed the expected difference in both colour and tuburculation (another made-up word, that works for me). This further emphasises the need to check spores, if at all possible.



Photomicrograph of mixed spores
(x100 greatly enlarged)
***Dryopteris dilatata* - dark**
***Dryopteris expansa* - light**

I am slowly building up a comprehensive collection of spore microslides, augmented by some photographic slide sets and may eventually learn enough to produce the BPS fern spore atlas. More work!

The main benefits gained from all my efforts are that there will be a reference collection to pass on to the next exchange incumbents and I have enjoyed messing about, sorting out how to mount spores and photograph fern spores. Anyone got £4000 spare to buy the 3D imaging software or, better still, £many more for a laser confocal microscope so I can adequately cope with the next stage? ———

ALIENS AND FOREIGNERS

Alastair C. Wardlaw

Why are there so few foreign ferns in the British flora and, of the several that *have* become established in the wild, why has only one achieved weed status? This is *Azolla filiculoides* (below), which is now over-colonizing ponds and canals, especially in the south of England. In 2002 *Azolla* was put on the proscribed list of the Royal Horticultural Society and banned from sale at RHS outlets.

PHOTO: JAMES MERRYWEATHER

Drain clogged by *Azolla* at Askham Bog, York

Azolla, however, is the exception. All the other species of hardy foreign ferns in British cultivation seem to be ecologically fairly well-behaved. They grow nicely where they are planted in gardens, they keep going for long periods without too much TLC, and they show only occasional instances of colonizing our wild places, despite releasing wind-borne spores.

Additional to *Azolla*, the only other wild-established alien ferns listed in the *New Atlas of the British and Irish Flora* (2002) are *Blechnum cordatum* (syn. *B. chilense*), *Dicksonia antarctica*, *Matteuccia struthiopteris*, *Onoclea sensibilis* and *Polystichum munitum*. Can we seriously argue lack of opportunity? Hardly! Back in Victorian times, these and a large number of other foreign fern species were freely available to gardeners in the British Isles and were widely planted over 100 years ago.

Many ferny places in the British countryside are visited each year by the eagle-eyed members of the several BPS Regional Groups. Yet the *Bulletin* rarely reports any foreign ferns as having been found during these excursions. Last year, for instance, the only mention I noticed in the 2002 *Bulletin* was *Azolla filiculoides* established at a site in Cornwall.

Can we therefore conclude that the British countryside is not a very friendly place for foreign ferns, despite their ease of cultivation in our climate and soils? Is it because the available fern niches have already been filled by native species? For the future, will the British fern flora turn out to be essentially complete with the few foreigners now established, or are we just at the beginning of a vast enrichment by escaping aliens?

I therefore make a special plea for the annual Regional Group Reports not only to mention all the foreigners found in the wild, but also to give specific negative statement of *No foreign ferns seen*, if that is the case.

Comments please for Pteridologist 2004

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